JPRS-ELS-87-046
31 AUGUST 1987

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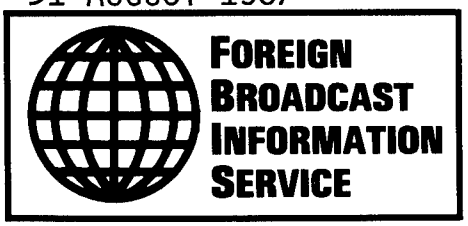

JPRS Report

Science & Technology

Europe & Latin America

JPRS-ELS-87-046

31 AUGUST 1987

SCIENCE & TECHNOLOGY

EUROPE & LATIN AMERICA

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TECHNOLOGY TRANSFER

/7310

AACHEN INSTITUTE EXAMINES NEW FIBER COMPOSITE USES

Duesseldorf VDI NACHRICHTEN in German No 23, 5 Jun 87 p 21

[Article: "Robot Winds Carbon-Reinforced Fiber Spindles: Special Research Is Working on Fiber Composites Technology;" first paragraph is VDI NACHRICHTEN introduction]

[Excerpts] VDI NACHRICHTEN, Aachen, 5/6/87--A flexible manufacturing center is being developed at RWTH [Rhine Westfalia Technical University] Aachen, in the framework of a special area of research, "Production Technology for Non-metallic Fiber Composite Components." The Aachen engineering scientists Professors M. Weck, T. Baumer and H. Zender have reported on this project, which will also be presented at the Aachen machine tool workshop on June 11 and 12.

Production costs can be reduced considerably by fully exploiting available rationalization potential in production by means of fiber composite technology as well as by processing more economical semifinished products. The Aachen Institute for Production Technology (IPT) is therefore working on developing a flexible manufacturing center for the treatment and processsing of components in fiber composites, which should allow more economical production through an optimal production process with the resulting higher quality. In this way, fiber composite technology could become more attractive for further applications such as producing components for machine tools.

The first components of carbon reinforced fiber to be produced to laboratory standards within the framework of the special research area are machine tool spindles and a forward feeding carriage for a formed wheel grinder. To do so, a loading robot is modified in such a way that the fiber composite material used for components and semifinished products (resins, fibers and prepregs) can be treated and processed.

The loading robot has a winding unit for production of rotationally symmetric components and a station the allows prepregs to be laid so as to produce flat components. Suitable handling equipment is being developed both for winding rotationally symmetric components and for laying down flat pieces. A fully automated production process is planned to go from the treatment station through the hardening furnace to the final processing.

Until now, loading robots were used mostly for conveyance and in simple assembly stages. Accordingly, controls are aligned to these tasks. In order to use the loading robot as a treatment and processing machine, the robot controls must be supported by suitable sensors. The memory capacity of the controls, for example, generally are not sufficient to store all the spatial coordinates necessary to describe the surface of a spherically domed component. Thus an analytical forecast of all the points to be passed will not in this case lead to the objective. Rather, a suitable sensor system must support the controls by correctly guiding the operating equipment.

An interruption of the production process to teach new component geometry would be ineffective and would prevent optimal capacity in the production process. For this reason offline programming of the robot controls is a goal. The objective is to translate data collected when constructing components using CAD into robot command data.

Along with the optimization of production equipment for fiber composite components, the use of new materials and semifinished products should also lead to an increase in economic performance. Thus in the production of fiber composite components with pressure setting plastic matrix the clock time is critically influenced by the structural hardening phase connected to the production process. By using thermoplastic matrices, an improvement in economic performance can be expected as this material needs no structural hardening.

8702
CSO: 3698/M318

FRG TO DECIDE HERMES, COLUMBUS FUNDING BEFORE FALL ESA MEETING

Officials Take Stance

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 20 Jun 87 p 6

[Article: "Federal FRG Budget Must Make Additional DM 255 Million Available for Preparation of Columbus, Ariane 5 and Hermes. Financial Risks Involved in Decision on Space Flight. Before Budget Committee Meeting"]

[Text] Bonn, June 19 (KB)--Even in the planning of international space projects it is apparent that West German participation is becoming considerably more expensive. An additional DM 255 million is to be made available in 1987 and 1988 from the federal budget for preparations for three programs alone--Columbus, Ariane 5 and Hermes. Costs for each of the three major projects have recently been calculated by the European Space Agency (ESA) at DM 8 to 8.5 billion over a period of 10 years (at 1986 prices). The budget committee of the Bundestag will deal with cost developments this coming Wednesday and will hear from Research Minister Riesenhuber--expected to be accompanied by Finance Minister Stoltenberg--concerning what financial risks are involved in political decisions in favor of future spaceflight. Despite a previously released interim report by the research ministry, CDU deputy Austermann, representing the CDU/CSU on the research committee, still does not feel that the committee has received sufficient information to permit a final decision on these programs.

Following enquiries at the ESA, Austermann expects the presentation in the coming weeks of a "long-term program" for European space flight up to the year 2000 which will be technically feasible and which will be able to be financed within budgetary constraints by the participating countries. All together, Columbus as Europe's contribution to the American space station, Ariane 5 as a powerful booster rocket for payloads of more than 20 metric tons and Hermes as a manned European space shuttle form a complete concept. Because this concept is already clearly outlined today, he says, all ESA member nations must orient themselves accordingly. In an interview with this newspaper Austermann reproached the minister of the Bundespost for looking around for other launch options for satellites such as in China. According to Austermann, Schwarz-Schilling would be better off relying on the European Ariane.

The federal government and the budget committee want to make the final decision before the long-term program is voted on by the ESA Council--the panel of all of the government representatives--on November 9 and 10. As before, regarding decisions on the Airbus, the FRG government is again being pressured from within and without on this question. Paris is exerting pressure with support from Rome. The British government, however, is hesitant to make a decision. Within the FRG government Foreign Minister Genscher is the leading proponent of Europe's own space program. Research Minister Riesenhuber supports the plans but always with the reservation that they cannot be justified on the basis of research policy alone. For that reason Riesenhuber also denies that his research budget receives an excessive share of space flight expenditures as a result of these three projects. Finance Minister Stoltenberg is worried that a final cabinet decision to realize the three projects could lead to unforeseeable budgetary burdens.

Budget committee member Austermann is in favor of extending the programs over a longer time period--without at the same time causing undue delays--in order to provide relief during the individual fiscal years. Time extensions would not compromise the developments and would not increase costs, says Austermann. To do this, the highest annual FRG contribution for all three projects need not exceed DM 1.3 billion according to ESA calculations. In the ESA statement of accounts, the FRG share would already reach more than DM 1 billion as early as 1988 if the time period is not extended, followed by DM 1.3 billion the year after and would peak in 1995 at more than DM 1.6 billion. However, there are also experts who present opposing calculations according to which the average annual FRG contribution up to the year 2000 would be at least DM 3 billion (at current prices). Austermann believes that realistic calculations must be made but also that on the other hand the European space program ought not be stymied from the very beginning by "astronomical estimates."

According to information provided by the research ministry, when preparatory costs alone increase by DM 255 million for 1987 and 1988, it is because key technical elements have to be changed in all three projects and safety provisions for the astronauts must be improved based on what was learned from the Challenger accident. Riesenhuber will ask the budget committee to approve the funds for extending the preparatory phase. The importance of a thorough preparatory phase, according to the research ministry, is shown specifically in the changes which resulted from the reviews conducted to date.

The ESA is running out of money for the preparatory work. By the end of March, DM 142 million had been spent from the FRG budget for the preparatory program for the Ariane 5; DM 59 million is to follow by the end of July and another DM 91 million by the end of the year. The preparatory program for Columbus has thus far cost DM 77 million. An additional DM 57 million has been requested from the FRG government. DM 28 million has been paid out of FRG government coffers to date for preparation of the Hermes project and another DM 48 million is needed. Restructuring within the research budget is expected to make DM 169 million available this year and DM 86 million next year to cover all of the increased costs. The ESA can only be paid when the funds are "released" by the budget committee. Worried that space projects, beginning with the cost of preparation, could lead to an "avalanche of expenditures," the committee last fall blocked release of the funds.

DM 225 Million to be Granted

Bonn DIE WELT in German 24 Jun 87 p 11

[Article by Heinz Heck: "New Thrust for Hermes and Ariane. Minister Riesenhuber Puts Additional DM 225 Million Into Space Research"]

[Text] Bonn--The budget committee of the West German Bundestag is expected today to grant Research Minister Riesenhuber an additional DM 255 million for further preparation of space-related activities. Involved here is FRG participation in the development phase of the major projects, Columbus, Ariane 5 and Hermes. The reasons given for the increased expense and the delays in the preparatory work (anticipated up until the end of 1987) are major technical modifications in the systems. Following the Challenger accident, increased safety requirements must also be taken into account. In addition, difficult negotiations with NASA--as before in the fall of 1986--concerning European participation in Columbus are again part of the picture.

Of the DM 255 million in increased costs, DM 169 million will become available this year which is expected to be absorbed by economizing within Bonn's ESA budget. Riesenhuber has requested additional funds amounting to DM 86 million for 1988. Although the official decision on actual participation by the FRG in the three projects will only be made following conclusion of the preparatory phase, there have been political assessments in favor of Hermes expressed by the Chancellor, for example, to French President Mitterrand. Retention of FRG participation is also being promoted by saying that otherwise the German share could be divided up among the other partners.

The ESA ministers conference is now to take place on November 9 and 10 instead of in June. Presumably, the FRG cabinet must also determine its own position by September. Whether this is possible in view of the numerous open questions involved, appears uncertain.

The man who reports to the CDU on the research budget, Austermann, is blaming the tardiness in presenting the applications for grants on the way the research minister is proceeding. The ESA is already out of money this month and this puts the budget committee under unnecessary pressure to make a decision. "The way the whole thing transpired was not optimum," he told DIE WELT.

The total costs for the three programs are currently estimated at DM 24 to 25 billion--specifically, about DM 8 billion for Ariane 5 (German participation amounting to 22 percent), DM 7 billion for Columbus (38 percent) and DM 9 billion for Hermes (30 percent). In order to finance the German share, Bonn's ESA budget appropriations had to be raised from the current figure of approximately DM 700 million by the mid 1990's to DM 1.5 billion. Austermann is urging an extension so that DM 1.2 billion would suffice. Even with all the support for German space flight activities, Bonn, in terms of its research policy, cannot afford to overextend itself, he claims.

12552
CSO: 3698/563

FRG INDUSTRY GROUP URGES NATIONAL SPACE ORGANIZATION

Munich SUEDDEUTSCHE ZEITUNG in German 22 Jun 87 p 22

[Article: "In Favor of a National Space Organization. The DIHT Demands More Influence Regarding European Program"]

[Text] Bonn (AP)--The Federation of Chambers of German Industry and Commerce (DIHT) has recommended the establishment of a convincing national space organization. In a report explaining its position, the DIHT criticizes the fact that with regard to space the FRG is currently "not assuming its due place, based on its excellent scientific, technological and economic potential." What is lacking, says the report, is a long-term concept on space and an efficient space organization.

For ensuring the status of the FRG as an industrial nation over the long term, space needs to assume the same importance in the FRG as in France and Japan. The FRG's space policy and its space industry must, with its own concepts and suggestions, exert greater influence on the European space program and "detach itself more from the leadership of other European nations."

Management Tasks Only

The DIHT therefore demands a new space organization in the FRG to replace the existing scattered jurisdictions. The national space organization should limit itself exclusively to management tasks. It should develop a national space policy concept and control its implementation. Coordination of the various interests shall not lead, however, to a state-guided industrial policy or to limits on competition.

The DIHT favors European cooperation in space research and cooperation with the United States. This is the only way that Europe, for competitive reasons, can achieve a certain necessary degree of independence. The DIHT expressed reservations about projects involving manned spaceflight. Most known market-oriented space activities to date are the result of unmanned spaceflight which has thus provided justification for its existence. The substantially increased cost of manned spaceflight, "due to a lack of sufficiently quantifiable market potential, is currently not easily justified." Therefore, manned spaceflight should not consume the funds for unmanned flight.

In Favor of "Hermes" and "Columbus"

Nevertheless, DIHT favors both European participation in the American project involving a manned space station and the construction of the manned European space shuttle Hermes. Columbus, the European module for the U.S. space station, allows participation without delay in the scientific, technical and industrial opportunities of manned spaceflight. However, completely equal status for Europe must be ensured in negotiations with the United States. With Hermes, the FRG share must be large enough to permit German industry a proportionate amount of participation in key technological activities. In addition, the considerable financial burdens of the Hermes project should not lead to a situation where, as with the Hotol or Saenger projects, more advanced generations of space shuttles can no longer be financed.

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CSO: 3698/563

SEP TESTS 'CERASEP' COMPOSITE MATERIALS FOR HERMES

Paris AFP SCIENCES in French 26 Mar 87 p 20

[Unattributed article: "First Tests Satisfactory on Composites for Hermes"]

[Text] Paris--Satisfactory tests on composite materials for the European space shuttle Hermes have just been carried out, SEP indicates in a communique. They showed that these ceramic-ceramic materials, manufactured by SEP under the name Cerasep, are very suitable for use in the space-plane's components, which undergo extreme temperatures during "re-entry" into the atmosphere when returning from a space mission.

SEP has been studying ceramic-ceramic composites for a number of years. Its former president, Mr Roger Lesgards, had in October 1985 taken a position favoring use of these materials in the Hermes shuttle, and had, at a press conference, presented journalists with a number of ceramic parts: aileron, stabilizer, and leading wing edge. It was in fact a section of the leading edge of the Hermes' delta wing which was subjected to the tests mentioned above, by the Avions Marcel Dassault-Breguet Aviation Corporation, the project's technical manager for aeronautics.

The objective of these tests was "to test the behaviour of the component under mechanical, thermal and oxydizing constraints, both individual and simultaneous," like those encountered on re-entry. "The test conditions selected were as close as possible to those experienced in flight, given the testing rrsources available today," SFP explains.

The leading edge being tested was subjected to push-pull and thermal-shock trials. In particular, it was exposed to 1,300-degree temperatures for 10 hours, and to 1,400-degree temperatures for 5 hours, which is far beyond the temperatures normally encountered during the half-hour that "re-entry" lasts. When these tests were completed, the piece still stood up several times over to "extreme loads," far exceeding the requirements it must meet during the craft's normal life, roughly ten years.

SEP emphasizes that this series of tests is part of the preparatory studies being conducted by CNES and ESA for the Hermes program. Hermes construction design will be decided upon at the end of the year.

It has been learned that the Hermes shuttle has recently once again been subjected to modifications. Its total orbiting weight, in particular, has been brought up to 21 tons, and this includes the installation of an ejectable cabin to afford better security for its 3 crew members. The specialists explain that the extreme loadings are 1.4 times higher than the maximum flight loads that the craft should never exceed in the course of its life.

SEP Profits Rise 42.3 Percent

In other news, SEP announced on 25 March a net profit fo Fr37 million, 42.3 percent above 1985 (Fr26 million). SEP's current balance has practically doubled from one year to the next, going from Fr54 million to Fr106 million, while the operating surplus has gone from Fr82 to Fr131 million, after Fr131 million in allocations for depreciation and reserves (Fr101 million in 1985).

Sales have increased by 16 percent, reaching Fr2.63 billion, of which 58 percent was from the space and liquid-propulsion division, 38 percent from the composites and solid-fuel division, and 4 percent from the image-processing division. The corporation's board has proposed a dividend of Fr20 per share (Fr16 in 1985), representing a total revenue per share of Fr30 (with a retention of Fr10 per share) and a distribution of Fr12.8 million.

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CSO: 526

SUCCESSFUL MICROGRAVITY EXPERIMENT BY MASER, SWEDISH PROGRAM

Paris AFP SCIFNCES in French 2 Apr 87 p 25

[Unattributed article: "Swedish-European Microgravity Experiments from Esrange"]

[Text] Kiruna--A 250-kg payload comprising experiments prepared within the ESA microgravity research program underwent microgravity conditions for 7 minutes and 15 seconds on 19 March, thanks to the launching of the first probe of the Swedish MASER program. Launched from Esrange, the European experimental center at Kiruna, the Black Brant 5 rocket went up to about 290 kilometers.

The experiments aloft, designed by West German, Dutch, Italian and Swedish laboratories, involved such research fields as immiscible alloys, metallurgy, heat transfer, and surface tension in liquids.

ESA had a 60-percent share in this experiment which, although it concerns fundamental research to explain physical phenomena governing the properties of materials, could lead to the development of new materials with many applications, from biology to electronics to aerospace.

Probe programs of this kind, such as the West German TEXUS program for example, in which ESA has a 50-percent share, have for several years been providing microgravity research with opportunities for flights characterized by frequency and flexibility.

Being independent of the big space systems, such as the shuttle or Spacelab flights, these programs represent (until the space-station/Columbus complex is usable) the means to conduct reproducible experiments, with performance in the microgravity area as good as or a little better than those that could be done in the vacuum towers that exist or are under construction.

In line with the bent of its specialized program, ESA is trying to promote this type of experiment with European industrialists, not only in preparation for new Spacelab flights, but above all in the context of the Columbus program.

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CSO: 3698/526

NEW CHIEF OF FRANCE'S SNECMA SEEKS STATE AID, PARTNERS

Paris L'USINE NOUVELLE in French 11 Jun 87 p 6

[Interview with Bernard Capillon, SNECMA CEO, date and place not given, by Alain Pauche and Jean-Pierre Casamayou: "More Competitiveness for Better Cooperation"]

[Text] At the age of 57, General Bernard Capillon, new SNECMA CEO, has not forgotten his years of acrobatics as leader of Patrouille de France. Granting its first interview to L'USINE NOUVELLE, Mr Capillon readily uses flight metaphors to define SNECMA's new objectives. Precise, convincing, concerned with the company's cohesion and independence, the former Air Force chief of staff fully expects to obtain the means necessary to pursue SNECMA's development.

[Question] You became SNECMA's president several weeks ago. What are your priorities?

[Answer] Like a pilot who is now a driver, my first job will be to push the throttle to carry out three tasks. First, be able to invest and rapidly obtain the necessary aid to effectively launch programs that are indispensible for the group's future. Next, do everything possible to simultaneously assure the production and sale of our products; we cannot invest if we don't sell. Lastly, further improve competitiveness. Even though productivity has increased by 60 percent in five year, that is still not enough. There is still progress to be made: reduce operating costs, improve sales and after-sale services, and so on. This key word, competitiveness, applies to everyone and everywhere, from president to crew. Mind you, none of these objectives have priority, because they all have it.

[Question] Your first goal is to very rapidly obtain money from your shareholder, the state. Are your financial needs that great?

[Answer] Yes. This year we are launching three major programs at the same time. A military engine, the M88, two civilian ones, the CFM56 for the new Airbuses A320 and A340, and a fast propeller engine, the UDF. These programs cannot wait, because the competition will take advantage of the least delay.

And even though we devote 25 percent of our revenue to research and development, our means are inadequate. Our self-financing effort has its limits: the company has invested 3.5 billion francs in 1986.

Our projects are so large that the state needs to help; it is in an even better position to do that, since SNECMA is now repaying what the state has advanced in the past. All the money lent for the CFM56 will be reimbursed in 1990; and while 500 million francs were paid back this year, 1 billion will be reimbursed in 1987. The stakes are enormous: if we don't have sufficient means to invest in time, we will simply lose the orders.

[Question] Despite the success of the CFM56, SNECMA's results are poorer. How do you explain that?

[Answer] It's the value of the dollar. When the dollar drops by one franc, SNECMA loses 500 million francs, since the company bills essentially in dollars. Tell me the rate of the dollar and I'll tell you my results!

[Question] Having successfully "married" General Electric, SNECMA appears as the French champion in international cooperation. Did SNECMA take off specifically as a result of its cooperation with GE?

[Answer] No. SNECMA took off alone thanks to its military engines. The cooperation with GE expanded its basis, particularly in the civilian field, thanks to the CFM56 family. But the group does not have an exclusive cooperation with GE; its companies cooperate significantly in Europe in the area of civilian engines--around the CFM56 and CF6, in the military engines M53 and Larzac, in landing gears, turbines, and space. The Larzac cooperation continues beyond national programs since we are working for the Luftwaffe.

[Question] Can your cooperation with GE move toward the military?

[Answer] Yes. General Electric wants us to have a good military program and to expand our cooperation in that area, either on a specific program or in mixed participations. We want to achieve it, but there are many obstacles. For instance, we must solve the very delicate problems of technology transfer.

[Question] Are you seeking other partners?

[Answer] Of course. We are looking for cooperations in Europe, particularly for the Rafale, which for us means the M88 engine. The recently created ACE International intends to associate other countries in the construction of the Rafale and its engine. For your information, we want to cooperate within ACE.

[Question] Are you seeking other customers than Dassault for the jets designed for fighter planes?

[Answer] Yes, we want to expand our customer list. We are working on the possibility of supplying jets to countries which want to build their planes, even if we end up in competition with GE.

[Question] Two years ago, the French industry deemed it best not to participate in the European fighter plane EFA. Today, you find yourself all alone. Do you regret that decision?

[Answer] When you want to establish a cooperation and you don't succeed, you have to admit that it was a failure. And you can't be satisfied with a failure. But when you stop an attempt at cooperation because conditions are not met, there is no blame.

We must not regret it, because agreement was not possible. Had we participated in that program, we would have risked losing part of our know-how. Our position has not changed: we must retain complete mastery of the engine technology which we are ready to share.

[Question] Could 1988 be the year of SNECMA's privatization?

[Answer] No. For me, that is not on the agenda.

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CSO: 3698/548

CNES DIRECTOR DISCUSSES EUROPEAN SPACE STRATEGY AT LE BOURGET

Paris LE MONDE in French 12 Jun 87 p 33

[Interview with Frederic d'Allest, director general of CNES, at LE MONDE, date not given, by Jean-Francois Augereau and Maurice Arvonny: "Europe Cannot Surrender Space to the Two Major Powers"]

[Text] On 11 June, at morning's end, Francois Mitterand inaugurated the 37th International Salon of Aeronautics and Space at Le Bourget.

An ambitious program to send men in space will be finalized on 22 and 23 June by the council of the European Space Agency (ESA). In an interview conducted at LE MONDE, the director general of the National Center for Space Studies (CNES), Frederic Allest, stated that Europe cannot surrender space to the two major powers, and that it must progressively increase its financial effort for space activities by 60 to 100 percent, depending on each country.

[Question] In 25 years, space activities in Europe have moved with some success from infancy to maturity. How do you see their future?

[Answer] In the next 15 years, Europe will have to continue its efforts at strengthening its position in the areas in which it has succeeded (Ariane, telecommunication, direct television and Earth observation satellites, and so on) and remain competitive with respect to the United States, Japan, China, and perhaps the Soviet Union. But it also has a new stake, space exploitation by man. Increasingly large objects, and increasingly complex laboratories and observatories will be launched by the two major powers. All these structures will have to be assembled, not to mention supplied and repaired in space; robots alone will not be enough.

In 1984, France suggested this approach to its partners, as a result of which the foundations of a manned space exploration program were laid by the European ministers during the Rome conference of January 1985. Today, the time has come to make some decisions. The European governments now must state--and

it becomes a true political choice--whether they are ready to pick up this new challenge, or whether they want the United States and the Soviet Union to be the only actors in this new conquest, particularly since we have in Europe the scientific and industrial capabilities to build a manned space station and assure its logistics with suitable means of transportation.

[Question] That is an expensive program. Can Europe finance it?

[Answer] I believe so. It is true that this program, whose substance will be discussed on 22 and 23 June by the ESA Council, and which will serve as the basis for proposals to be advanced by the agency's director general to governments, can appear to be ambitious. But it remains very modest compared to those of the Americans and the Soviets. It is therefore not unreasonable to consider asking Europeans to progressively increase their contributions from 60 percent to 100 percent depending on each country. It is a matter of political will.

At present, Europe spends about 1500 MUC (Footnote 1) (10.2 billion francs, the current price of one accounting unit being 6.85 francs) per year on space. It will have to spend more in order to finance the Ariane-5 launcher, the Hermes space plane, the Columbus manned unit which will be included in the American space station, and the Pallas autonomous visitable module, while retaining the rest of its programs (scientific tasks, earth observation, and so on). In fact, the annual expenditure peak should reach 2400-2500 MUC in 1994 and 1995 (Footnote 2) (16.4 to 17.1 billion francs at today's rate of exchange). This is under discussion, but the admission of new countries (Austria and Norway), and of two associate members (Finland and Canada) into the agency, should make things easier, especially since Spain, a full member of the agency, indicates its wish to significantly increase its participation in ESA's programs. All countries will not increase their expenses at the same rate. To finance these programs, France for instance, will have to raise its ongoing space budget from today's 5 billion francs, to about 8.5 billion francs in 1990.

[Question] But will it not be necessary to move more slowly than planned?

[Answer] Beyond a certain point, we cannot extend the programs lest we increase their cost, disband the teams that worked on them, and disrupt the coherence of the whole. It does not make sense to develop the Ariane-5 rocket, which has priority because of its commercial ramifications, without starting, albeit with a slight delay, the parallel construction of the space plane Hermes and the Columbus station. These systems are not totally unrelated, and with time, we would risk losing our know-how. In fact, Ariane-5 will not be fully perfected until it has flown with Hermes; similarly, Columbus will not be useful until we have a transportation vehicle for the people who will man it. We therefore have some flexibility for extending programs and expenses, and we can discuss delays of six months to one year; but certainly not three or four years.

The proposals that will be submitted by ESA to the European governments stipulate January 1995 for Ariane's first experimental flight, 1997 for that of Hermes, and 1996 for launching the first element of Columbus. The launching of the Pallas visitable module (MTFF) is scheduled for 1998. As you can see, this schedule has slipped with respect to the initial objectives, and therefore allows expenditures to be stretched out over about two years.

[Question] Aren't you afraid that these European efforts will take place at the detriment of other programs, particularly of national ones?

[Answer] That must not be. The space research and technology programs that we carried out at the beginning of the 1970's allowed us to build the Ariane launcher, the Telecom telecommunications satellite, and the Spot satellite. They are the ones which have made it possible to propose Hermes today. But competition in space will become even stronger. That is why I believe that a minimum of 6 percent of the French space budget must be devoted to such studies; it would be a major mistake to not do it as an economy measure.

As the Soviet, American, Japanese, and European programs have clearly shown in the past, science has played and will play a fundamental role in space activities. The difficult and ambitious tasks created by these activities are true test benches for new technologies. We seem to be readier to take risks with a kamikaze probe that will cross the tail of Halley's comet, than to take risks with a satellite that will assure telephone service 24 hours a day. For these reasons, science in the French program must reach a level of the order of 10 percent.

Our European partners are in complete agreement with us. Each of them has his priorities, but they are all aware of the fact that a balance is necessary between the effort toward access to space, represented by Hermes, cooperation with the Americans, and development of European technology. This balance is a key to the success of the ministers' conference of November.

Difficult Negotiations With Americans

[Question] Where do negotiations stand with the United States on Europe's participation in the space station?

[Answer] They illustrate the limits of cooperation. Our American partners have unquestionably made substantial efforts, but discussions remain difficult. The United States consider the space station as a national asset whose idea they have initiated and most of which is financed by them. They therefore want to exercise the greatest, if not absolute control over the station. But the Americans have recently accepted for the Europeans to have control and mastery of the elements they build for the American station, even though it is clear that the conditions will not be the same for the manned module integrated in the station, and for the independent modules (polar platforms and Pallas) which would dock to it at times.

The Americans have also accepted the principle of access to the station by the Ariane-5 Hermes space transportation system. But before the negotiations are ended, we must check that there will no physical impossibility for this access under the guise of last minute security problems. Similarly, we must specify the manner in which utilization time, energy resources, and exploitation costs will be shared. Negotiations on this point will be very delicate. Lastly, there is the problem of the station's eventual use for military purposes. The drafts we have received refer to the peaceful utilization of the station consistent with international laws and agreements; given various possible interpretations, a compromise should be found on this point.

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CSO: 3698/542

AEROSPATIALE PRESIDENT ON FINANCING, CONSTRUCTION OF A330/340

Paris LE MONDE in French 16 Jun 87 p 45

[Interview with Henri Martre, president of Aerospatiale, date and place not given, by Alain Faujas and Jacques Isnard: "Europeans Must Share the Work"]

[Text] Whether for Airbus, helicopters, or space, the president of Aerospatiale, Henri Martre, asks Europeans to share the work. Otherwise, competition among European partners will remain wishful thinking.

[Question] Are you satisfied with the launching of the Airbus A-330 and A-340? Are you not experiencing some financing difficulties?

[Answer] We could not be more satisfied by this launching. The future of Aerospatiale, a partner of Airbus Industrie, is clearer as a result. Airbus could not have remained an international competitor with a limited range of planes. Airbus' goal to capture 30 percent of the civilian airplane world market, has very good chances of being achieved with these two new planes. As for financing, between 1987 and 1994 we have to find 12 billion francs on the financial market. To improve our debt capability we will increase our own funding by looking either to the state or to the public. Of the 12 billion francs we need, 35 percent could come from this increase in our own funding.

Our research and development effort for all our civilian and military activities remains very great; it represents 27 percent of our revenues, namely 6.9 billion francs. We finance it with Ministry of Defense contracts and with repayable advances from the Ministry of Transportation; we also self-finance 2.5 billion francs, namely 10 percent of our revenues, while our competitors allocate an average of 5 percent. We reap a very advanced technology, but at a cost.

Boeing Wants the Disappearance of Its Rivals

[Question] Would you broaden the Airbus line into very small planes of 100 seats, or into very large ones with 500 seats?

[Answer] For the time being we stop here. What comes next will depend on market demand. We are working on several projects, such as the AS-100, a turbofan 100-seater; but one of these days Boeing will launch its 757, which will compete with our A-320, and our first concern will be to respond by expanding the A-320 family.

[Question] Who are your most dangerous competitors?

[Answer] On the commercial jet plane market, Boeing predominates with 65 percent of sales, while McDonnell Douglas and Airbus share the rest. Boeing has said that it would like to see the disappearance of its competitors. We would undoubtedly find cooperation possibilities with McDonnell Douglas.

[Question] Would this agreement with McDonnell represent your answer to the American accusations of unfair competition?

[Answer] The financial support of European governments to the launching of the A-330 and A-340 is consistent with the regulations of the General Agreement on Tariffs and International Trade (GATT). I can understand that the Americans might be worried about business, but that is not sufficient reason to attack us. In fact, we enjoy a wonderful cooperation with the American engine manufacturers General Electric and Pratt and Whitney, which are delighted that we are selling more and more planes equipped with their jet engines.

The idea of an alliance with McDonnell Douglas is based on the desire to confront Boeing together. Negotiations with this collaborator have been interrupted. They will resume after the launching of our four-engine plane, the A-340, which actually does place a constraint on its three-engine MD-11.

[Question] The Airbuses are built by six or seven partners. By further expanding this international cooperation to McDonnell Douglas and others, are you not concerned about reducing the share of the pie allocated to each manufacturer?

[Answer] It difficult to go any further among European manufacturers. The plants of MBB, British Aerospace, Casa, and Aerospatiale, are already integrated, and from a commercial and industrial standpoint we work as a single company. That's a very important fact.

By the same token, we are seeking to expand the Airbus "club" to new associates. We are already working with Fokker and Belairbus, and are conducting discussions with Canadair and Saab. The inevitable consequence of cooperation is that the shares might shrink, but our programs are increasingly extensive and are reaching the limits of our capabilities. There is therefore some room: cooperation means sharing.

But as long as we do not merge, we will remain competitors on some products; it requires a certain flexibility.

[Question] Will the A-330 and the A-340 be profitable?

[Answer] This program was started only for its profitability. Its balance point is expected around the 100th plane. We needed the two planes together because they have many common parts and equipment. That is why we could not reach an agreement with McDonnell Douglas, because they wanted us to abandon the A-340; we would have lost the economic basis of the program, since the A-330 alone is not viable.

[Question] You say that you want to obtain maximum revenues with a minimum of personnel. Do you still have room for higher productivity?

[Answer] To sell on the world market we must reach the same level of productivity and competitiveness as our American competitors. The objective is very clear; we are close to their performance and at times we surpass them. But our goal is to be better than them. The personnel understands it very well; they agree that we can achieve good results only by increasing sales and reducing our manpower. And they also agree that we can make further progress in productivity through greater mechanization and an administration which fully uses the resources available to it. It is in this last sector, in administrative services and program management, that we can achieve the greatest progress through computerization.

Retain Dissuasion Capability

[Question] What do you think of one of your shareholders, the Ministry of Defense, when it states that recourse to foreign technology is not a bad approach, and that it could very well import transportation planes for instance?

[Answer] If, when faced with a military need, the French manufacturers cannot come up with a domestic project, it is logical for the Ministry of Defense to buy equipment where it finds it. It is part of its responsibilities; it is up to us, industrialists, to present solutions.

As I understand it, there are two different transportation requirements for the French Air Force. For long distance transportation, essentially for Africa, the Transall was not given a sufficient range to reach a certain number of points, and at present, we have no solution to offer. For logistic transportation between Air Force bases, we have proposed a solution which we believe is excellent and consistent with the need, the ATM-42.

[Question] Can we at the same time build S-4 random deployment nuclear missiles, as well as the M-5 missiles for the new strategic submarine?

[Answer] The two programs don't have the same schedule. Between the M-4 missile of the present submarines, and the M-5, there was a lull in design activities which would have led to the dissolution of design groups. But in the M-4, S-4, and M-5 succession, there exists a coherence which makes it possible to retain essential brain power potential, and consequently for France to maintain its capability to design ballistic missiles for its deterrence power.

[Question] Are you earning money from space?

[Answer] Overall, this activity is nearly balanced, but we have some disappointments on this market, which is growing much less than expected. Our civilian space activity is in some difficulty, even though it is experiencing a small growth.

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CSO: 3698/542

AERITALIA OFFERS SPACE LAUNCH SITE 'SAN MARCO' IN KENYA

Paris AFP SCIENCES in French 19 Mar 87 p 31

[Unattributed article: "Aeritalia Project to Space Launch from Kenya"]

[Text] Rome--The Italian aerospace manufacturer Aeritalia is planning to use the Italian San Marco base in Kenya, American boosters and West German cooperation to conduct space shots, officials of the group indicated.

During a colloquium which started 12 March in Rome and was sponsored by Assicurazioni Generali and dealt with the conquest of space and its risks and costs in insurance terms, two Aeritalia engineers revealed that negotiations were under way with the Italian and West German governments to put this Topas project in concrete form.

Aeritalia, which has been participating for years in American and European space projects, is hoping to avoid feeling the consequences of the delay in the American space-shuttle program in its experiments in the field of microgravity: considering the delayed launches, they declared, it would be 6 or 7 years before Aeritalia would get space on this shuttle.

Hence the idea of turning to resources that are already available: the Italian San Marco launch site, which is especially advantageous in being close to the equator, the American firm LTV's Scout rocket, and General Electric's re-entry vehicle.

According to their estimates, the cost per launch would not exceed 15 million dollars, which is less than the prices offered by NASA and Arianespace. The Soviets, they recalled, are presently offering launches at prices 50 percent below those of the West for capacities up to 21 tons, while the Chinese, for their part, are now entering the market with a 1.3-ton capacity by means of their Long March III rocket.

Aeritalia is thus betting on a market estimated at some 65 billion dollars, in which supply is limited since the Challenger catastrophe and the various setbacks to Titan 34-D, Delta and Ariane.

Since the Kenyan launch site is already operational, only 2 years would be needed for finetuning this project, on which the German firms OHB and

Kaiser Threde are working. The Italian firm BPD (SNIA, whose majority shareholder is Fiat), for its part, is studying a more powerful version of the Scout.

As far as the Topas project is concerned, Aeritalia sees good commercial prospects for it, in view of the considerable demand for microgravity experiments from industry and research.

13070/9190
CSO: 3698/526

UK JOINS RESEARCH PHASE OF HERMES PROGRAM

Paris AFP SCIENCES in French 26 Mar 87 p 22

[Unattributed article: "Great Britain Joins Preparatory Phase of Hermes Program"]

[Text] London--On 19 March, Great Britain announced its decision to participate, to the extent of 2 million pounds, in the preparatory phase of the European Hermes space-shuttle program.

The British Space Centre indicated in London that its director general Mr Roy Gibson, had announced the decision in Paris on the 19th to the directors of the ESA, who had met to prepare for the organization's next council meeting, planned for June.

A spokesman for the British Centre, Mr Mike Hitchcock, explained that participation in the Hermes preparatory program in no way signified that Great Britain was renouncing its own competing rocket-plane project, dubbed HOTOL. Nor did it represent a definitive commitment by London to go further in the Hermes program in the future.

He indicated, on the contrary, that British Aerospace and Rolls Royce Aeronautical were presenting carrying out feasibility tests on HOTOL, the pilotless shuttle which, by his account, is to take over from the Ariane 5 satellite boosters somewhere around 2005.

Mr Hitchcock declared that inclusion in the Hermes research phase would permit several British firms and universities to acquire "extremely interesting" experience "in the field of state-of-the-art technology," and to have access to techniques "which will in the future be usable in other systems." This will particularly be the case in the areas of hypersonic aerodynamics, aerothermics, robotics, and remote manipulation systems.

He announced that Great Britain was hoping to garner the participation "of other ESA member nations in the revolutionary HOTOL program," for which London has already released 3 million pounds. He emphasized that one of HOTOL's main attractions is a 20-percent reduction in satellite-launch costs.

Before committing itself further to the HOTOL program, however, the British Space Centre is waiting to learn that funds the conservative

government of Mrs Margaret Thatcher will decide to allocate to space research.

At present, Great Britain's civilian space budget is on the order of 110 million pounds a year, which puts the country in fourth place in Europe, slightly behind Italy, and far behind the Federal Republic of Germany and France.

The British Space Centre requested "a substantial increase" in the government's contribution, in order to be able to broaden its participation in such projects as the construction of the Columbus manned space module, another ESA project. The British Space Centre also desires to increase Great Britain's role in the field of communications satellites and orbital-based photography. The British cabinet's decision is expected shortly.

13070/9190
CSO: 3698/529

BRIEFS

AUSTRALIAN PARTICIPATION IN A340/A330--Toulouse--Five Australian companies signed a 4-percent participation agreement with Airbus-Industrie for the A340/A330 program, the European consortium announced on 20 March. These firms--Aerospace Technologies of Australia, British Aerospace Australia, Dunlop Aviation, Hawker de Havilland, and Kucas Aerospace--plan to take part in the program in accordance with an agreement signed last month and carried in the Airbus-Industrie monthly newsletter. The Australian industry, which is already subcontracting the manufacturing of components for the A300, A310 and A320, will take responsibility for design and development of the parts it will be producing. Fiat Aviation had already signed a similar contract with Airbus-Industrie at the beginning of the year. The A330 will be a twin-engine jumbo jet with 328 seats and a range of 8,300 kilometers; the A340 will be a four-motor long-distance liner with 262 to 294 seats, and will be able to traverse 13,200 to 14,300 kilometers. The European consortium's oversight council, which met in Toulouse on 13 March, decided to "take all necessary steps for the formal initiation of the program in mid-April." [Text] [Paris AFP SCIENCES in French 26 Mar 87 p 31] 13070/9190

CSO: 3698/529

'DOMS' OF FRANCE TO SELL PHARMACEUTICALS IN USSR, INDIA

Paris L'USINE NOUVELLE in French 14 May 87 p 47

[Text] Doms Laboratories will set up a pharmaceutical production unit in India between now and the end of the year. This dynamic PMI [small- to medium-sized company] of 140 persons is essentially geared to exports. It could start a second installation in Pakistan as early as next year.

Doms Laboratories specializes in bronchial pneumonia therapy. Its sales moved from Fr 18 million in 1976 to Fr 100 million in 1986, essentially in the domestic market. In 1979, Colette Nouvel-Rousselot, chairman of the board of the enterprise, decided to set up an export department, but not with a view to the European market.

There is strong competition there for a small company and she felt it was preferable to wait for the special market forecast for 1992. Hence, Doms Laboratories looked to major exports from the start. They had three targets: USSR, India and Pakistan.

Now, success is in the offing. After five years of work and an investment of Fr 1 million, Doms has been authorized to sell three of its products in the USSR; marketing is to begin soon. These are the first products to be marketed in the USSR by a French PMI.

In India, a unit is under construction in New Delhi in collaboration with a local partner. The plant will employ about fifty persons and should start production of cough syrups as of next September.

A joint venture of the same type is planned with two Pakistani laboratories for construction of a plant in Karachi. In both cases, the active ingredient for the products will be imported from France.

Doms also has a Canadian presence in the form of the Doms Canada subsidiary which sells non-prescription medications.

Doms will invest a total of two million francs in its export developments in 1987. Colette Nouvel-Rousselot's goal: to have exports constitute 25 percent of sales.

7072/9835
CSO: 3698/494

BULL'S ARCHITECTURE STRATEGY FOR AI

Paris GENIE LOGICIEL & SYSTEMES EXPERTS in French Mar 87 pp 27-30

[Article by Jean-Martin Videcoq of Bull CEDIAG, 68 route de Versailles, 78430 Louveciennes; phone: (1) 39 02 51 79: "AI Architectures"; numbers in parentheses refer to bibliography]

[Text] In a recent LE MONDE article (11) concerning IBM's 1986 results, Francoise Vaysse concluded her analysis as follows: "But the main worry remains the slowdown of growth in computer sales: Users are no longer interested in a race for power; they want their simplest requests to be considered."

One could cite many similar statements to show that data processing in the 1980's has entered a new phase: The customer is no longer ready to adjust to data processing's constraints, but thinks now in terms of problem solving. This means that the products that both manufacturers and service companies offer their customers must:

-- consider the customer's real needs;

-- provide solutions integrating all aspects of a product's life cycle, as seen from the user's viewpoint.

The AI and expert systems market cannot escape this rule: It will become increasingly difficult to sell software and hardware tools if they cannot fit easily into the environment of the client companies.

Based on this assumption, this article will broach the question of architectures and performance requirements in the major AI applications on micro- and minicomputers and on mainframes.

What Do Users Want?

Most discussions about AI deal first of all with its content, its various disciplines and its theoretical foundations. Rarely do they deal with the reasons for using AI. The approach is like saying: "I have got the solution, what are your problems?"

This mind-set, which no doubt explains AI's difficulty in penetrating companies, is changing as the first large industrial expert systems become operational. One sign of this change is that most AI service companies are now as interested in software engineering, network and architecture problems, and link-ups with existing data processing equipment as in AI itself (10).

In fact, it seems that one of the major bottlenecks in developing expert systems lies in their interface with conventional data processing. "Expert systems must be integrated into accomputerized environment with different technical standards than those of AI, thus creating connection problems. Yet the inflexibility of conventional data processing creates the need for more flexible and 'human' interfaces. AI and expert systems should play a major role in this area when the compatibility problems between the two data processing styles (conventional and AI) have been resolved (6)."

There is thus reason to think about both the company's needs and about how to introduce AI into their organizations. Throughout 1986, the Bull group's AI Development Center (CEDIAG) was able to record the expectations and requirements of some of Bull's major customers concerning AI.

Three types of concerns emerged, which are difficult to rank in order of importance but which appear in all the studies.

1. Companies want to improve their data processing productivity, whether by shortening application production cycles or by reducing their maintenance costs. Conventional data processing cannot provide response times that meet the growing needs of companies to upgrade. The costs and delays for upgrading are considered difficult to tolerate, be they for applications, for basic software or, of course, for hardware.

2. Decisionmakers see AI as a means of broadening the field of data processing applications, though they have no clear understanding of the limits of this approach. Still, expectations are still high in the areas of decisionmaking aids, diagnostics, forecasting, delegation of responsibility, planning and the dissemination of all kinds of expertise.

3. However, a generally recurring theme is the need to protect past investments. The evolution towards integrating AI techniques, considered necessary, should not raise questions about earlier investments in human potential, organization, data processing architecture and networks and existing applications.

AI products must take these constraints into account, or risk being rejected as research which has no application outside laboratories and university centers. It is in this light that the problems of performance and architecture must be dealt with.

Users define these problems of performance and architecture on the basis of three parameters which head their list of criteria for satisfaction (9):

-- response time;

--number of simultaneous users;

-- productivity aids such as user-friendliness, versatile environments and portable programs.

Let us consider how AI can satisfy these expectations.

The Constraints of AI

An entire issue of the journal IEEE COMPUTER (January 87) was recently devoted to the question of new computer architectures designed to support AI applications. By way of introduction, it is pointed out (12) that solutions based on today's processors, even those dedicated to AI (LISP machines), can improve the performance of some AI applications, but are unable to handle the complexity of combinational processing in AI.

What are in fact the principal characteristics of AI techniques?

-- Symbolic processing: Symbolic primitives such as comparing, masking, sorting, integrating [?unification] and any logical operation on various form types.

-- Non-deterministic computing: Many algorithms used are non-deterministic and require exhaustive explorations of all solutions to a problem.

-- Dynamic execution: To gradually explore solution space [in the memory], it must be possible to create new data structures and new functions at any time, to dynamically allocate and free the necessary memory space. AI languages do integrate these memory management functions. One of the results is that codes and data have no specified location, making conventional storage memory mechanisms [? caches memoire] inefficient.

-- The possibility of addressing and efficiently using large areas of hierarchical memories.

-- The need for powerful processing capacity possibly allowing distributed and parallel processing.

-- Knowledge management, which presupposes the availability of a variety of representation tools (functional programming, logic programming, programming according to production rules, objects, frames, etc.) and eventually their physical and logical connection to the companies' databases.

-- Open systems which allow both upgrades in environments and constant improvement and acquisition of new knowledge.

How To Develop?

Intelligence is and will long remain the most expensive component of expert systems. More than 50 man-years were necessary to transfer R1 to industry, producing XCON, which DEC currently uses to configure its computers (2).

The time and knowledge of experts are very expensive and often rare. There are still few AI specialists and knowledge engineers on the market. They must

therefore have access to powerful user-friendly tools (hardware and software) which will allow them to produce at a rate commensurate with the economic stakes.

The Hardware Environment

A very complete list of AI machines can be found in IEEE COMPUTER (5). However, here we are interested only in machines already on the market, i.e., essentially language-oriented machines (especially LISP) and workstations.

-- LISP machines have widely penetrated the market (about 2,000 installed machines (3); their cost ranges from Fr 200,000 to Fr 1 million). They are built with the aid of dedicated processors (single or multiprocessors, tagged memories, etc.). The principal lines are the Xerox 1100, Symbolics 3600, LMI Lambda, Fujitsu ALPHA, Tektronix 4400 and Texas Instruments Explorer.

These dedicated, single-user machines increasingly face competition on the AI market from scientific workstations, based on the 68020 under UNIX, whose performances are becoming increasingly comparable.

In fact, because of their market, workstation technology will remain at least 2 years ahead of symbolic machines in the price/performance cycle (7).

-- More than 7,000 of these stations are estimated to be in use for AI applications; they cost between Fr 100,000 and Fr 500,000 and are generally single-user. The best known are Apollo, Sun, Hp 9000, Micro Vax II, Tektro and Bull SPS7/9.

Whether on a dedicated machine or a workstation, configurations allot each station:

-- several megabytes of read-write memory (typically 4 to 8 megabytes);

-- several tens of megabytes on disk (from 40 to over 100 megabytes);

-- hundreds of KLIPS (logical inferences per second), thus several MIPS (millions of instructions per second) per station.

-- The arrival of new 80386-based boards (GC LISP, Humming board) and of memories of several megabytes (8 megabytes) makes it possible to predict small AI applications on modified PC/AT's at a cost of Fr 100,000 and Fr 150,000. The future will tell which will carry the day--the bottom-of-the-line 68020/68030-based stations or the 80386-based microcomputers.

-- Finally, it generally appears that development of AI applications on mainframes is not considered a future trend, except for very special applications, because performance problems make it costly (due to low productivity of men and machines).

The Software Environment

AI applications development requires a software engineering environment which supports all phases of the product's life cycle: specification, prototyping, architecture, development, testing, upgrading and maintenance. Moreover, the environment must adapt to different users in each of these phases: designer, developer, knowledge engineer, expert and user.

In current environments, only the development aspect is covered and the interface is oriented essentially toward the developer (specialist in AI tools).

On what models (paradigms) are these environments based? Starting from the basic levels represented by functional programming (LISP), logical programming (Prolog), production systems (OPS5), and object- (Smalltalk) or frame-based (FRL) programming, today's shells are oriented toward multiple-paradigm representation systems flexible enough to adapt to several fields. The best known are in the United States: KEE, ART, LOOPS and Knowledge Craft (8).

Aware of the strategic importance of such a tool, the Bull group has developed KOOL, Knowledge representation Object Oriented Language, a shell which closely combines objects, frames, production rules and functional programming models (1). KOOL was announced in November 1986 and is available on the Bull/SPS line.

Implementation

The architectural approaches for operating AI applications depend largely on operational constraints:

-- Varying degrees of connectability with existing data processing, particularly for networks and access to databases.

-- The volume of applications, which depends on the size of the databases and on their possible breakdown into sub-bases.

-- The number of users, whether potential (occasional access) or simultaneous.

-- Update characteristics, which can be measured by frequency and volume.

-- Quality of interfaces, notably the need for multiwindows, graphics, color, a mouse, etc.

The approaches which emerge are thus generally compromises that attempt to reconcile the various constraints. The principal solutions are as follows:

Implementation on a Workstation

Implementation is directly on AI workstations which can connect to a file server allowing access to knowledge bases.

Strengths:

-- provides a good environment, high-level interfaces;
-- allows use of large-scale applications.

Weaknesses:

-- limited number of users due to high cost of stations;
-- poor connectivity with existing data processing;
-- difficult to update applications.

Implementation on a Microcomputer

Implementation is on AI-dedicated microcomputers which can connect to a server allowing access to knowledge bases.

Strengths:

-- offers a good environment, user-friendly interfaces;
-- allows many users at once, given the low cost per station.

Weaknesses:

-- limited volume of applications;
-- does not allow frequent or voluminous updates;
-- does not offer a close connection to databases.

Implementation on a Back-End Configuration

One or several AI stations are closely linked to a server supporting an entire secondary network of terminals.

Strengths:

-- allows link-up with existing data processing facilities (centers, networks);
-- supports large-scale applications.

Weaknesses:

-- allows only a limited number of users;
-- offers less user-friendly interfaces.

Implementation on a Front-End Configuration (Micro-Mainframe)

AI-dedicated micros communicate with database servers.

This solution offers the same advantages as the microcomputer solution, but also allows hook-up to existing databases.

Implementation on a Front-End Configuration (Micro/Workstation)

AI is implemented on a cluster of closely linked stations whose graphic

interfaces have been remotely ported via network to microcomputers ensuring interactions with the users.

This solution offers the same advantages as the workstation solution, but also allows the porting of interfaces, notably for graphics.

Strategy at Bull

Bull set its AI strategy in 1985:

-- As for research, the ECRC [European Computer Research Center] (together with ICL and Siemens) and the Bull research center (60 researchers in all) are preparing the tools and architectures of tomorrow.

-- The group's AI Research and Development Center, CEDIAG, is responsible for contributing to product strategy, for developing the range of languages and tools (LE-LISP, XILOG, SP-Prolog, and KOOL) and for assisting the production lines for porting them to the various Bull hardware products.

-- The sales networks are gradually developing to provide promotion and support for these products as well as an advisory and assistance service, in collaboration with companies specializing in AI.

The strategy's goal is to offer Bull customers integrated solutions which can implement AI techniques on their hardware:

-- 1986 saw the first offerings in development sites with the announcement of LE-LISP, SP-Prolog and KOOL on the SPS line and XILOG on the Micral line.

-- 1987 should offer the first operational solutions: extended LE-LISP addressing and KOOL run-time on Questar and Micral.

-- The following years will see further offerings in developmental and operational uses: database hook-up, distributed architecture based on Bull's micros, stations and mainframes (DPS). Eventually, the whole line should support a standard set of Bull AI tools, capable of allowing distributed AI applications to communicate through the DSA network.

Outlook

The years 1983-1986 were marked by spread on the industrial level of development architectures, thus opening the prospect of large-scale AI applications.

The years 1987-1990 will thus be marked by a strong demand for implementation of the various operating architectures described above.

This period will also be characterized by:

-- the recovery of markets for bottom-of-the-line stations (680X0=zero) and top-of-the-line microcomputers (80386);

-- integration of symbolic coprocessors in these microcomputers or stations, allowing them to equal the power of dedicated machines;

-- ever-increasing integration of memories providing tens of megabytes per user.

In the 1990's, fifth generation machines should appear, which will make more or less extensive use of parallelism:

-- new language-oriented machines, a Prolog machine and machines for functional programming;

-- knowledge-based machines oriented toward semantic string processing and rule- or object-based systems;

-- machines with intelligent interfaces for speech recognition, image processing and vision analysis.

But in the beginning these machines will be essentially development-oriented, and a new cycle will be needed to achieve operating architectures satisfactory to users.

In conclusion, it seems that the main obstacle to be overcome to open up AI to industry is its integration into the existing data processing environment. This means that AI will have to acquire all the data processing technologies which surround it and without which it is nothing. Subsequently, building from this base, it will be necessary to put new architectures progressively into operation which will allow AI to blossom while taking into account both the development and the implementation environments.

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25060/12859
CSO: 3698/A221

BRIEFS

FRENCH AI INITIATIVE--INRIA [National Institute for Research on Data Processing and Automation] has recently created a subsidiary, Ilog, which will implement the institute's work in software intelligence. A first subsidiary, Simulog, was founded 3 years ago to handle activities in scientific computing, production systems and modeling of data processing systems, according to INRIA. Ilog "will cover areas common to software engineering and AI based on software intelligence." Ilog, with a capital of Fr 1.5 million, has the short-term goal of offering products and services in four distinct areas: LISP language, development tools for software intelligence, advice for developing dedicated systems and training in these technologies, languages and tools. Pierre Haren is the managing director of Ilog and Jerome Chailloux the scientific director. Recruitment is underway among INRIA researchers and in outside organizations. Ilog's address is: 19 Rue Royale, 75008 Paris; phone: (1) 42 68 13 44. [Text] [Paris LA LETTRE DE L'INDUSTRIE INFORMATIQUE in French 30 Apr 87 p 2] 25060/12859

CSO: 3698/A221

FRANCE'S SODERN LEADING INDUSTRIAL INNOVATION

Paris L'ARMEMENT in French Apr 87 pp 83-94

[Article by General Bensadoun, engineer, CEO of SODERN: "SODERN At Age 25"; first three paragraphs are L'ARMEMENT introduction]

[Excerpts] SODERN [Nuclear R&D Company Ltd.] was a product of the first French atomic explosion on 13 February 1960. The Military Applications Directorate of the Atomic Energy Commission [CEA], in conjunction with the Atomic Section of the Armament Directorate (Footnote) (The Atomic Section of the Armament Directorate established by General Chanson, came under the Armament Research and Production Directorate, now the Ground Armaments Directorate), then used outside neutron sources which proved vital for industrial production of the atomic weapon.

At the initiative of Chief Engineer Jacques Robert director of military applications, and of Chief Engineer Henri Guntzberger, special assistant to the minister of defense, the CEA and the Ministry of Defense together decided to assign a military engineer the task of establishing an operational unit within private industry to deal with a critical problem: the production of neutron sources.

The originality of this operation and its subsequent success have led L'ARMEMENT to present to its readers an article by the military engineer entrusted with this responsibility, General Bensadoun, currently CEO of SODERN and the TRT [Radioelectric and Telephone Telecommunications].

In 1962 with the agreement of General Lavaud, ministerial deputy for armaments, the Atomic Energy Commission (Military Applications Directorate) gave me the assignment of establishing the research and development capability required to produce the neutron sources needed to detonate the nuclear charges of the French Deterrence Force.

In 1987 SODERN, which grew out of this effort, has Fr 200 million in total revenues and a staff of 340, including 140 engineers and professionals. The firm's achievements include:

--supply of all neutron sources installed over the past 25 years in the various components of the Strategic Nuclear Force (FNS), as well as in all those used in the Sahara and Pacific test centers.

--placing in orbit of more than 100 attitude sensors used on all French satellites, on a significant portion of the European satellites and on satellites of the international Intelsat V program. These sensors have logged 1.8 million hours (i.e., more than 2 centuries!) of failure-free operation in space.

--supply of star sighting devices for the European Space Agency's [ESA] orbiting laboratory, Spacelab, successfully used during the August 1985 shuttle mission.

--production of the detection unit on the focal plane of the French SPOT satellite's camera, which since February 1986 has provided superb pictures of our planet, from an altitude of 800 km and with a resolution of 10 meters, making it the world's most powerful civilian observation satellite.

This year SODERN is celebrating its 25th anniversary. This article retraces its history and the ongoing involvement of its two major sponsors, the CEA and the DGA [General Directorate for Armaments].

Initial Phase: Acquisition of Expertise in Neutron Science--1962-1968

When the government tasked the CEA with providing France with a nuclear weapon, CEA took inventory of the scientific and technological capabilities required and of their location within the public and private sectors in France.

In an effort to involve industry in its undertaking, it drew up lists of components and equipment which might be subcontracted to outside firms.

When the CEA noted that the Applied Physics and Electronics Laboratory (LEP), a subsidiary of the French Philips company, had a capability in gas-filled tubes that complemented its own expertise, it proposed that that capability be used to create a structure for the development and production of neutron sources.

What did this mean? In brief, a nuclear reaction is initiated when a critical mass of fissionable material is reached. To optimize this reaction, however, it must be set off by radiating the material with a neutron flux, with the neutrons acting like the spark of a combustion engine spark plug.

These neutrons are emitted (inside a tube containing tritium and deuterium) during a very brief but perfectly calibrated and precisely timed pulse in the firing sequence.

The deuterium, sufficiently ionized and accelerated by an intense electric field, strikes a tritium-labeled target, and the fusion reaction of deuterium and tritium generates high energy neutrons.

The skills required to produce these neutron sources include the fields of:

--vacuum physics,
--hydrogen isotope applications,
--very high voltages (on the order of 100 kilovolts),
--high speed logical electronics to control the process.

These are, of course, applied in the most advanced and most compact technologies and in an aeronautical and ballistic environment.

In May 1962 SODERN began operations.

The CEA and the LEP brought their capabilities to SODERN, and the first neutron source for the Mirage IV charge was developed for the first version of the first FNS generation.

Then followed the development and production of sources for the various generations of strategic arms (SSBS and MSBS) and tactical weapons (Pluton, airborne weapon and ASMP missile), as well as for all the test charges.

Until 1968, the CEA asked SODERN to work exclusively on the development of reliable and safe neutron source production processes, without extending its efforts into new research activities.

When the CEA saw that SODERN was consistently and repeatedly meeting the specifications demanded for both performance and reliability, it lifted its original constraints and even encouraged SODERN management to seek ways to diversify.

Second Phase: Entry into Space--1968-1980

The CNES (National Center for Space Studies), also established in 1962, then began a parallel effort to acquire industrial expertise in designing and developing launchers, platforms and payloads needed by any country or group of countries seeking an independent space capability.

Essential for space autonomy are optoelectronic sensors which make it possible to control a satellite's attitude relative to other celestial bodies (earth, sun, stars).

The sensors either operate in the infrared spectrum and detect the earth's own radiation and that of its atmosphere, or function in the visible spectrum and measure very precisely the bearing of one or more stars whose celestial position is known.

The CNES recognized the unquestionable experience of the LEP-SODERN association in infrared detection and asked SODERN to consolidate France's then scattered capabilities in this area.

That is how SODERN, with the help of the CNES and then of the ESA, designed and produced the infrared attitude measurement sensors for the Sumphonie 1 & 2, D2B, Signe 3, OTS and Meteosat satellites.

SODERN went on to equip the Intelsat V series and the Marec, ECS, Telecom 4, and SPOT satellites.

SODERN thus developed its role as the supplier of highly specialized equipment and entered into close relations with the French "systems" firms, Aerospatiale and Matra, and their European counterparts, MBB, Dornier and Marconi.

In 1979, the company's space revenues came to almost 30 percent of total revenues.

Third Phase: Star Sighting and Earth Observation--1980-1987

Even while pursuing the development and production of neutron sources, which remained its major activity, SODERN continued its initiative into space in the early 1980's by undertaking production of star sighting devices for Exosat, the ESA's scientific satellite.

Although the accuracy of the infrared sensors produced by SODERN until then was limited to a few minutes of arc, the star sighting devices are highly sophisticated instruments which locate and measure the position of a magnitude-8 star --thus totally invisible to the naked eye--with an accuracy on the order of a second of arc (a golf ball at 10 km).

Exosat was launched successfully in 1983, and the star sighting devices operated without failure for the entire life of the satellite.

At its start, SODERN was entrusted by the ESA with the production of star sights for the extremely accurate pointing of the IPS [not further identified] instrument-bearing pallets on board the American space shuttle--despite the shuttle's residual or occasional movements. SODERN systems thus made it possible to reset the attitude of the solar telescope on board Spacelab during the August 1985 flight, another successful mission.

Then came a process which often occurs in the opposite direction--spin-off benefits from civilian industry to the military.

Indeed, in 1977 the Directorate of Shipbuilding asked SODERN to design and produce star sighting devices for submarine periscopes. The Missile Directorate [Direction des Engins] also charged it with exploratory work using this technology continuing a long-term cooperative effort between Aerospatiale and SODERN.

All this work has given SODERN a unique capability in this area in Europe. It is the only European company to have placed its own star sighting devices in orbit and to have mastered the use of image dissector tubes for this purpose. It is also the first in the world--at least for civilian applications--to have produced a microprocessor-based sighting device and flown it in space.

Relying on this capability, SODERN began cooperation with Matra in 1985 to develop a solid-state sighting device using charge transfer devices. It should be placed in orbit in 1987 or 1988 as part of the French-Soviet SIGMA experiment for measuring celestial gamma radiation.

At the same time, the firm's experience has extended to image detection. For SPOT, besides the "eye" of the satellite (the attitude measuring sensors), SODERN is supplying "heart" of the camera, i.e., the detection unit located in the focal plane of the telescope, which analyzes and converts the images from earth into electrical signals that can be recorded on board the satellite prior to transmission to ground stations.

1987 has seen the development of this particular technical niche because the CNES has tasked SODERN with the design studies for the detection units on the new HRV-IR and Vegetation instruments on board the future generation SPOT 4 and because SODERN will also participate in the development of the Helios military observation satellite.

Fourth Phase: Neutronic Diversification--From 1987 to...2000?

This year, for its 25th anniversary, SODERN is launching the Diane project in cooperation with the FRG's IABG research institute and Spain's SENER. This project was selected for the European EUREKA program at the June 1986 conference in London; its goal is to build a mobile neutronographic system for nondestructive control of structures or materials, using neutrons, just as radiography uses X rays.

Neutrons have the property of interacting more specifically and selectively with lightweight atoms; they thus make it possible to detect corrosion under paint, bonding defects and cracks or fissures in composite materials. The use of such systems in the aeronautical and space fields should result in considerable savings in production and maintenance.

That is just one of many examples of the civilian use of neutrons. Many industries are interested in the generators developed by SODERN for mining and petroleum exploration, control of continuous flow processes, detection of radioactive waste, location of explosives, etc.

The "civilian neutron" therefore has a bright future in store, provided SODERN is able to include a range of generators covering such diverse needs in its catalog.

Since its creation in 1962, SODERN has worked to transfer its most advanced scientific technological achievements to industry.

While initially directed exclusively towards satisfying the needs of FNS programs, SODERN has gradually expanded its activities to space optoelectronics, image processing and display, and automation, as part of its successful diversification; today those activities represent nearly 60 percent of its revenues.

However, it is from the standpoint of the exemplary cooperation between government and industry that these 25 years should be viewed. Born of the farsighted determination of CEA and DGA leadership, SODERN brought to each stage of its development the concrete proof of the validity and clarity of the goals it was initially assigned:

--to perform an exclusive mission for the Ministry of Defense and make this the starting point for routine industrial operation;

--to develop a unique product and to advance it from a technological idea to an engineering innovation to the complete satisfaction of its partner-customer;

--to turn its multinational industrial exposure to the advantage of the national industrial infrastructure;

--to prove its competitiveness through successful diversification in the highly demanding international market.

Guided by its enterprising and innovative spirit, SODERN is girding itself to face the challenges of the year 2000 as it embarks on its second quarter century.

I should like to conclude this account by honoring all those who have assisted me in this task. Among these were numerous armaments engineers. However, as is always the case with our defense firms, there were also engineers from all disciplines who made their own contribution to the joint endeavor.

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BOSCH GROUP ACTIVITIES, PRODUCTS DESCRIBED

Milan AUTOMAZIONE OGGI in Italian May 87 pp 164-169

[Interview with Eros Beltramone and Sergio Ziraldo of the Industrial Equipment Division of the Bosch Group by Valerio Alessandroni; date and place not given]

[Excerpts] AUTOMAZIONE OGGI [A.O.]: Eng Ziraldo, could you describe the current activities of the Bosch Group, particularly with regard to industrial automation?

Ziraldo: Our flexible systems are oriented primarily toward the assembly and processing of batches that are relatively small but which are made up of a great variety of parts. So far, the major sectors in which we have been involved are the mechanical and electromechanical engineering sectors and integrated circuits. Since the companies of the Bosch Group operate primarily in the automobile sector, our FMS [Flexible Manufacturing Systems] are designed basically for this type of application. In this way, in fact, we have become our own best customers.

A.O.: What are the latest sales figures available?

Ziraldo: The most recent figures refer to the period 1979-83. 1979 sales were DM10.804 billion; by 1980, this figure had risen to DM11.809 billion, increasing to DM12.905 billion in 1981, DM13.812 billion in 1982, and DM14.352 billion in 1983. R&D expenditures for the same period were DM575 million, DM639 million, DM681 million, DM752 million, and DM785 million (1979 to 1983 respectively). Finally, in 1982, automobile equipment sales accounted for 62.4 percent of total sales, followed by communication systems (18.7 percent), technical consumer goods (13.3 percent), and instrumentation (5.6 percent).

A.O.: What is the Bosch marketing structure?

Ziraldo: Bosch currently distributes its products either directly or through a controlled distribution network, which has been strengthened in the last few months. The service organization is based on training courses in the Milan headquarters and on individual distributors, whose training also includes familiarization with the software.

A.O.: What are the essential characteristics of Bosch robots?

Ziraldo: We now offer a range of three models: the new SR450 and SR600, and the highly successful SR800. All the models are available both in a basic version and in versions with a pneumatic lifting axis, electrically-controlled vertical track, pneumatically-controlled vertical track, or attachment surface for special constructions.

The characteristics shared by the whole range are: the position measurement system, based on an incremental optical transducer; belt synchronization (the movement of a transfer system with a stroke measurement system is superimposed on the programmed movement of the robot); speed presetting; monitoring system (limitation of the working and software limit switch, monitoring of the position on the basis of the set speed, with interpolation delay [no close parentheses as published].

The control system has 64 inputs (at 24V D.C.) and 40 outputs (at 24V D.C., 0.1A). Of these, 30 inputs and 10 outputs are user-programmed. Last, the capacity of the program memory is equal to 1,000 bits.

A.O.: What future developments can we expect for Bosch robots?

Ziraldo: Given that our robots were originally designed with pneumatic modules and tracks, it is possible to produce not only Scara configurations but also Cartesian systems and portal systems. We will give these possibilities a concrete form in new products that will be added to the existing range. The Scara robot also is undergoing a process of constant evolution in terms both of the software used and the accessories.

A.O.: There is one specific product line which is characteristic of Bosch. This is the flexible manufacturing systems line. What are the major characteristics of this family?

Ziraldo: Bosch has always followed a policy of continuous commitment to high productivity levels through the analysis of manufacturing methods and the use of process innovation. This is the philosophy behind our flexible manufacturing systems, an area in which the company offers a family of products with fully compatible hardware and software.

The new Bosch flexible manufacturing system comprises modular system components which permit any possible combination. It offers base functions (for the creation of manual workstations, automatic workstations, and double-belt manufacturing lines), pick-and-place handling elements (double-belt lines, rotating tables, and pick-and-place element [polmonamento] systmes), handling components for single pieces (collection units, orientation units and movement units). Last, it offers control/regulation units (sequential commands, data exchange systems, and pneumatic modules).

All this offers a number of major advantages: the manufacturing system is a standardized, modular system; methodical utilization of the modules gives rational solutions to problems; guaranteed assembly cycles; phased automation of the workstations with phased investments; work becomes autonomous because it is not tied into the machine cycle; and manufacturing is flexible as regards both human resources and variations in [production] quantities and varieties. Last, these systems simplify the retooling required by product changeovers or the introduction of new products.

A.O.: Another characteristic product is the multipin connector system. Could you describe the major advantages of this system to us?

Ziraldo: Our units for electrical installations with multipin connectors make it possible to install machines rapidly and easily, offering a valid alternative to junction boxes.

Simply by plugging into the control panel, it is possible to connect signaling equipment and electrical control equipment such as motors, magnetic valves, and proximity switches. The fact that all the individual parts can be fitted with identification plates means that the chances of making wrong connections are practically zero. Consequently, the various parts in these systems can be replaced by non-specialist personnel.

Last, we believe that the advantages offered by the rationalization of the various modules are absolutely indispensable. Using a CAD [Computer Aided Design] system we can, in fact, program the entire plant layout and produce a list of the modules required. These modules can then be assembled by any operator.

A.O.: Mr Beltramone, programmable controllers are undergoing a rapid and interesting technological evolution. What is Bosch's response to the new requirements of this sector?

Beltramone: Bosch offers a complete product line in the sector of programmable controllers. This line goes from small, highly versatile units (the CL100) to larger units (the PC200, PC400, and PC600) for more sophisticated applications. This range is completed by the PU401 positioning unit, the TS400 text storage module and the DG intelligent diagnostic unit.

Bosch, like many other manufacturers, operates in the context of MAP [Manufacturing Automation Protocol] since the company is extremely sensitive to the problem of interfacing different equipment. Today, our research center has the capability to develop an interface software between any programmable unit whatsoever, not simply those produced by Bosch.

Moreover, the smallest unit in our range can be connected to the ring of the other units in the family, for which more sophisticated communication cards are available.

Bosch is about to launch a new series to respond to the new market requirements. This series, the CL300, should provide greater performance than the present series at the same price.

A.O.: A key factor for a successful market launch of the new PLC [Programmable Logic Controller] is constituted by programming languages and supports. What can your company propose here?

Beltramone: Today, our PLCs can be programmed with wired logic or programmed logic. However, the new programming units (the PG4) will be capable of working with the MS-DOS operating system and therefore will open up new possibilities for the future.

A.O.: What is Bosch's market position in PLCs in Italy?

Beltramone: Bosch was a relative latecomer to the PLC market in Italy and therefore it is not easy to increase our market share. The fact that many FRG companies in Italy purchase their PLCs locally certainly is in our favor, and thanks to this indirect approach to the market our units are installed in numerous machines and lines.

A.O.: One Bosch line in particular has always been extremely successful commercially. This is the line of digital controls. Could you outline the major characteristics of this line for us?

Beltramone: Bosch started by developing digital controls for machine tools. However, the new generation of digital controls, starting with a four-axis CN [digital control], make it possible to implement other applications extremely flexibly. The key to this high level of flexibility is constituted by the parametric capability and the integrated logic, requiring keyboard programming only, without the need for any external intervention.

Starting with the new units (the CC100), more specific ranges have been developed, including the CC200T (for lathes) and the CC300 (for large work centers and FMS). However, the hardware used in our new digital controls is repetitive, permitting interesting extensions. Also, by modifying the software, these units can be used to control industrial robots. Finally, provision has been made for a bus connection with the programmable controllers.

A.O.: The last product line we would like to know a little more about is the electric starting motor line. What are the most significant technological aspects in the Bosch range?

Beltramone: Bosch production is strongly oriented toward brushless technology, and the company was one of the first to experiment with this technology. In recent years, we have added to our range a series of motors with rare-earth magnets and a series of motors for mandrels.

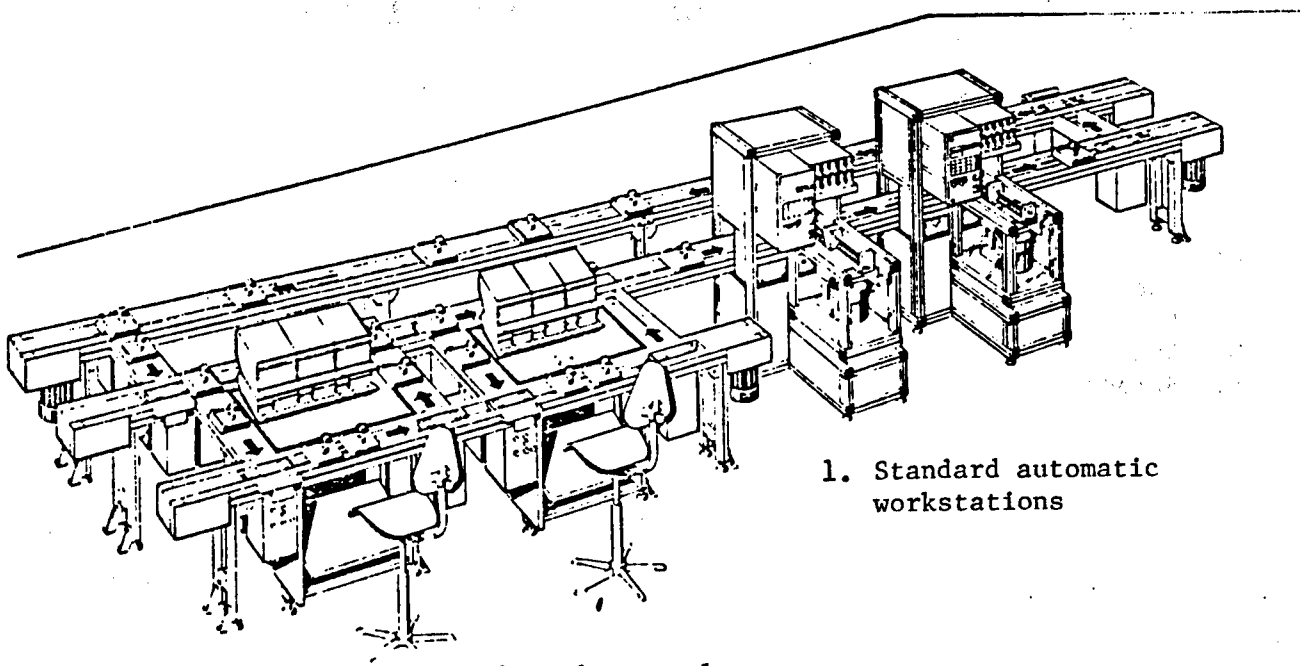
Direct-control axes or mandrels are, in fact, being used more and more, and not just in the machine tool sector. With the Servodyn series, it is possible to obtain the approach, positioning and regulation movements, as well as mandrel movement units for a wide variety of applications, such as machine tools (work islands, lathes, milling machines, and so on), manufacutring machinery and plant or transportation systems (the automobile and textile industries, the plastic and timber industries, and others), handling systems, and industrial robots.

The very fast reaction times in the Servodyn movement and torque controls guarantee the greatest accuracy in positioning, speed, and torque regulation.

A.O.: One last question. Faced with an increasingly difficult market (the industrial automation market), the accent today is not only on product quality but also on ancillary services (pre-sales and after-sales services, design advice, training, and so on). What is Bosch's position in this connection?

Ziraldo: Our position can be summed up in a few words. While Bosch Italia's activity comprises marketing and technical assistance only, the company's "flexible automation" department is in a position to guarantee pre-sale and after-sale services, advice on design and applications, and training courses. As regards component personalization, this is delegated to the distribution network and to local constructors and, last but not least, to the user.

Fig. 1 A flexible manufacturing system produced with standard Bosch units.



1. Standard automatic workstations

2. Independent cycle workstations

Fig. 2 The SR800 robot with adjustable arm; this is the most powerful robot in the Bosch range.

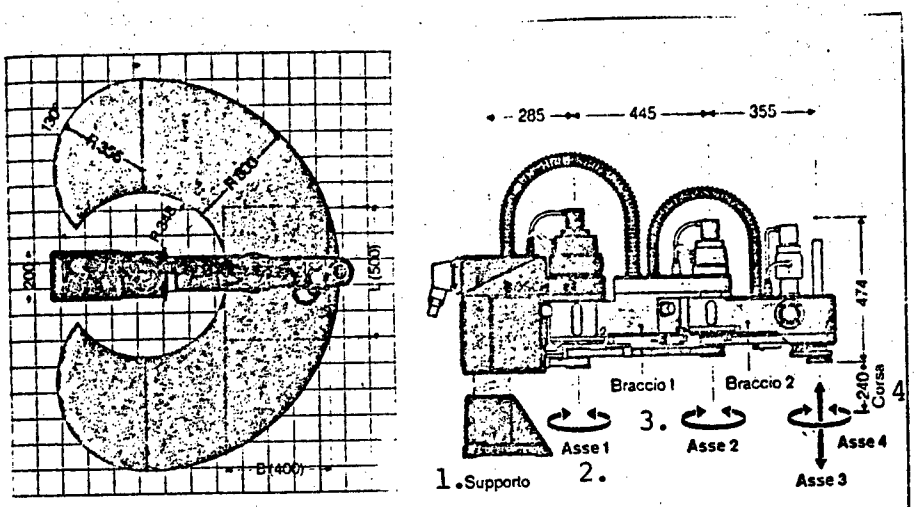


Fig. 2 - Il robot a braccio orientabile SR 800: il più potente della gamma Bosch.

Key:
1. Support
2. Axis
3. Arm
4. Stroke

Fig. 5 Example of the implementation of Bosch modules for electrical installations: the 380V A.C./450V D.C. system.

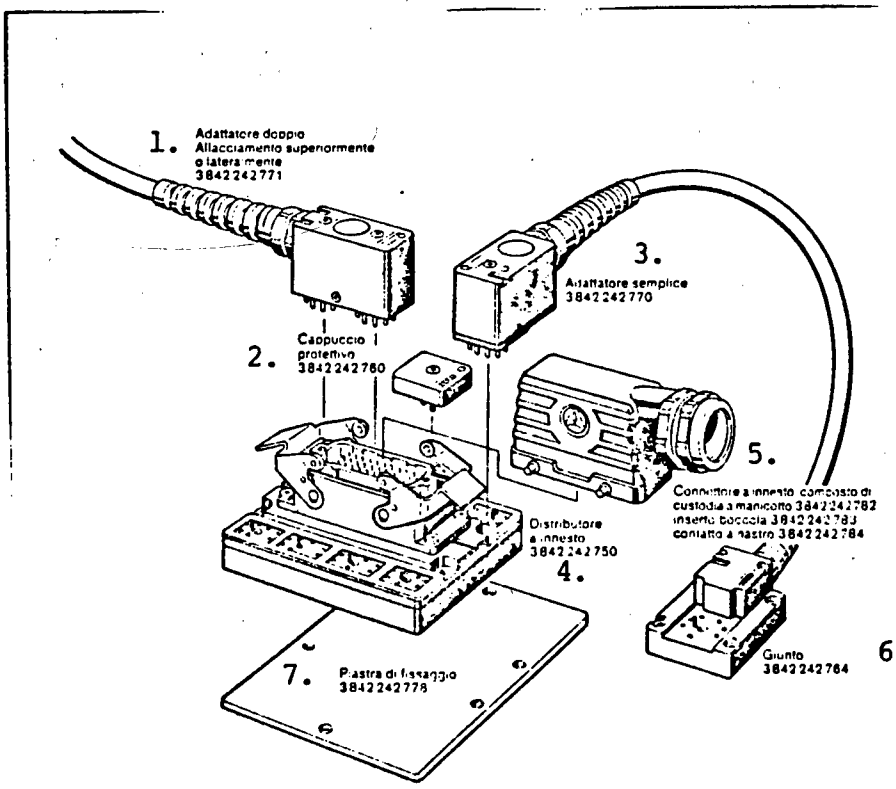


Fig. 5 - Esempio di realizzazione con i moduli per installazioni elettriche Bosch: il sistema a 380 Vca/450 Vcc.

Key:
1. Double adapter; upper or side attachment
2. Protection hood
3. Simple adapter
4. Multipin connection distributor
5. Multipin connection, consisting of protection cover with sleeve, insert piece, and ribbon-type contact
6. Joint
7. Attachment plate

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CHIEF OF NEW THOMSON-SGS FIRM ON R&D, MARKETING STRATEGY

Paris Supplement to ELECTRONIQUE ACTUALITES in French No 884, Jun 87 pp 14-16

[Interview with Pasquale Pistorio, head of United Semi-Conductors, by C.H.R.: "Thomson/SGS the Top Industrial Producer"; date and place of interview not given]

[Text] Pasquale Pistorio has just taken charge as head of the new company formed by SGS and Thomson. He must now shoulder the heavy task of achieving the goals of the two groups: Attain membership in the clan of the 10 top world-class enterprises, and become a major force in the international market. With an annual revenue of $800 million and a total of 18,000 employees, the new group ranks 2nd in Europe and 12th worldwide, with 3 percent of the market. Pasquale Pistorio reviews the main points of the policy he intends to pursue. "We are in a phase where we must learn to take stock of ourselves," he says, "so that we can determine how we're going to work together." It will be several months yet before the company will be in a position to define its precise objectives and the funding it will seek for a 5-year plan.

[Question] SGS and Thomson Semiconductors have just announced the creation of a jointly-owned company, United Semi-Conductors, the management of which you now head. What strategy do you intend to put in place to enable this new entity to play a major role from the international standpoint?

[Answer] First, a few considerations of a strategic nature. The new company will be judged from an industrial viewpoint, but even more from a strategic one. I have been saying for the past 7 years now that the most strategic branch for any advanced industrial company whatsoever is that of semiconductors. Today, everyone agrees on this point; but that has not always been the case. The chip war between the United States and Japan, the financial support being provided by governments, are proof of the strategic interest of this sector. Semiconductors represent the intelligence of every electronic system. This is why mastery of this technology is vital for the future of every electronics industrial group. And by the same token, for every advanced modern industrial company.

The reason for the intensity of the war the United States, Japan and Europe are currently waging against one another is purely and simply this sector's industrial and strategic importance to everyone. To take part in this war with any chance of winning it, one must be armed with the right weapons. This means, first and foremost, the industrial power that determines one's investments in R&D, marketing facilities, and production on a large scale. Thomson and SGS, which had the same type of strategy, as well as comparable objectives and needs, concluded that the only thing--not the best but the only thing--to be done was to create synergies to attain the industrial dimension without which one can only hope in vainto be among the groups that will remain once the restructuring of the market is complete.

[Question] More precisely, what is the new company's strategy going to be?

[Answer] Separately, both companies have already committed funds to attain, each on its own, that critical dimension. They have accomplished some magnificent things. I say this with a bit of pride, at least for SGS. They have both put effort into enhancing their technological base, augmenting their product lines, and internationalizing their activities. In the case of Thomson this effort has taken concrete shape in its purchase of Mostek, and for SGS in the installation of plants in Asia. The first action the new company must undertake will have to be the building up of the strong points of each of the two groups while reducing to a minimum their weak ones. In concrete terms, this means continuing their efforts in research and development, optimizing their production activities, and continuing their policy of commercial internationalization. What I am expressing at this time are the principles. At the end of but the first week, all I can give you are our conceptual guidelines. During the next 6 months, my primary objective will be to develop a more complete "grasp" and to prepare, together with the two [parent] companies, a 5-year plan that will combine these principles with, to be sure, concrete measures. I will need several months to work out the company's fundamental strategic axes. The potentialities of the two groups, and above all their complementarity, are encouraging factors for the future.

[Question] Does this new company really have the means to take on their American and Japanese competitors?

[Answer] With an annual revenue of $800 million, the new company is close to the critical dimension of $1 billion. But its weight is obviously still insufficient if one considers that presently there are American and Japanese groups two-and-a-half times more powerful. Sizable outlays will therefore have to be made to bring it into line with its principal competitors. This will not be easy. The first step has been taken. And it is far from being the smallest of steps, for I consider this alliance to be the biggest that has come about in the semiconductor sector in Europe. As for means, I believe we have them as a result of the synergies that are going to be developed in all domains, thanks to this agreement.

The New Group

Item	Thomson	SGS	Thomson + SGS
1986 Annual Revenue ($ Millions)	436*	375	821* [as published]
Including, in Europe	302	244	546
Ranking on World Scale			
Total	17	21	12
Discrete Components	13	20	8
Integrated Circuits	16	17	13
Market Share (Percent)			
Total	1.7%	1.5%	3.2%
Discrete Components	2.7%	1.6%	4.3%
Integrated Circuits	1.4%	1.4%	2.8%

*Figure for 1986 includes military activities, which are not included in the agreement.

[Question] You stress the real complementarity that exists between the two groups. Nevertheless, there are areas of overlap that will have to be eliminated, leading inevitably to layoffs. The talk is of 10 percent.

[Answer] The existence of areas of overlap is entirely normal. The two companies were competitors. Very fortunately, these areas are limited. If they did not exist, how could we make economies!

Clearly, we are going to be compelled to redefine the missions of each production unit, and to distribute the work differently so as to eliminate duplications and enhance the synergies between the two groups.

Without this alliance, there would have been layoffs, since both companies were losing money.

The new company's annual revenue per employee is of the order of $44,000. To be profitable, it must attain the threshold of $50,000, or closer yet to around $55,000. Our American competitors' annual revenue per employee is around $60,000 per employee. Thus, as of today, our revenue per employee is not competitive. We have no choice but to quickly attain the level of our competitors.

Taken separately, the two companies had little chance of attaining this goal rapidly. Together, the probabilities of success are real. To attain it, there are but two possible: Growth of annual revenues, and reduction of staff. Our staff must be reduced. The size of this reduction will depend on our ability to increase our sales. Evaluating this size as of now is impossible. It is utter nonsense, economically, to say, as some have said, that we are going to eliminate 20 percent of our staff. There is no relationship between that figure and 15 percent... I must refrain from making predictions lest the future prove them wrong. However, I believe we will attain our goal of $55,000 per employee before the end of this year, and $60,000 before the end of 1988.

[Question] You have said that mastery of the technology is determinative of the new company's future. Do you have the means to match your ambitions in the area of R&D? And are the Government's subsidies sufficient?

[Answer] To be a player in the international competition, the aid our Governments provide must be as ample as that of our principal competitors. It is not a matter of being favored through preferential aid, but rather one of not being disfavored vis-a-vis our competition.

I have the feeling that, at this point, our Governments are aware of the seriousness of this problem and that they are going to take the needed steps.

For our part, we must base our activities on four priority sectors: 1) Technology, centering our efforts on VLSI and integrated power; 2) Systems, developing complex products high in value-added content--products for

telecommunications, for example; 3) Softwares, which pace the development of the basic technologies and of the products of those technologies; and 4) Optimization of production capacities. The success of the Japanese industrialists is based on their production science. The Americans have recognized this and have incorporated it in the Semantec project. All the major companies are concentrating their efforts in these four sectors. We cannot hope to figure among the market's leaders unless we have these trump cards in hand. What will make the difference is our range of product lines and our management.

[Question] You have said that the road to success must be routed via internationalization. What is your plan in this regard?

[Answer] The two companies represent a substantial market base in Europe. We must begin immediately maintaining and strengthening this base by improving our relations with our clients. Concurrently, we must press forward with our penetration of the American market and make our entry into the Japanese market. We are already present in the United States, and with the Mostek plant we now have the necessary means to increase our market share there. Our Phoenix unit is ready to start operating. It will do so as soon as we have need of it; perhaps this will be later than originally planned, since the Mostek plant is operational. Our marketing networks are in place. All they need now is optimizing.

In Southeast Asia we are present specifically by way of our Singapore plant. Obviously, there is the problem of the Japanese market. And there, what we will need is imagination, finding new solutions. To be effectively present in a market, it is not enough to merely ship plants there, or even to install one there. One must understand that market, and adapt to it. As regards the Japanese market, I don't know as of now how to proceed. Be that as it may, we must find ways to reduce the time needed to penetrate the market. And in this regard, the only way to proceed, in my view, is to form alliances with local partners that can be translated by commercial agreements, and by technology transfers.

Under present conditions, that is the only thing to be done. We have started to do this by forming a joint company with Thomson. This is an agreement that no more than 2 years ago everyone thought to be inconceivable. We must continue along that line and go even farther. Our competitors are doing the same thing. Note that Motorola has teamed up with Toshiba. AMD and MMI have merged. This process of alliances is under way throughout the semiconductors industry.

[Question] Some observers think the recovery that is beginning to make its appearance will be short-lived, in that the industry is not even at the start of its restructuring as yet. What do you think?

[Answer] We are going through a very difficult period. The chip war between the United States and Japan is but one episode. Another one, between

Japan and Korea, is already brewing. The big risk we Europeans are incurring is that Europe will become a "dumping ground" where everybody will come to offload their production surpluses. We have the duty and the right to protect ourselves against this extremely dangerous risk.

Protectionism is one of several weapons. We must, above all, become competitive and not resort to protectionism except in certain specific cases, and, in particular, dumping. Governments, individually, have taken cognizance of this problem. Europe, in turn, must do the same. This is more complex because of the Community's nature. We must protect ourselves not against our own weaknesses but rather against unfair business practices. Europe, like the other countries, must refuse these practices. Europe has the means to assert itself. Seven years ago it was already being said that Europe was finished. I was not in agreement with this view then, and I still am not. Like the United States, Europe has financial and economic resources. The Philips/Siemens mega project and the Thomson/SGS agreement prove that Europe can do battle against the American and Japanese industries. I am convinced it is not losing ground. But the going will not be easy.

There are now manifest signs of a recovery, particularly in the United States, while, for the time being, Europe marks time. This recovery is characterized by a significant excess of production capacity. Furthermore, this recovery is not being accompanied by a gain in profit margins; on the contrary, the downward pressure on prices and margins continues. I believe we will see a strengthening of prices and margins next year, provided we achieve a balance between production capacity and demand.

Unfortunately, this situation will be transitory, since the restructuring of the industry and the price war are going to continue throughout the next 10 years or so. There will be ups and then downs. As of now, all the big companies are in a position to gain market share without augmenting their investments. As long as an imbalance continues among the major geographical sectors--Southeast Asia, the United States, and Europe--the situation with which we must cope will be a difficult one. Worldwide, the electronics industry is undergoing a restructuring in which small firms are disappearing--except for those few possessing leading-edge technologies in very narrowly defined niches--and which will lead to a phase of maturation. When? In 10 years, perhaps. I'll be retired by then!

9399
CSO: 3698/547

FRANCE TO STRESS INNOVATION, INCREASE ANVAR BUDGET

Paris LE MONDE in French 23 Apr 87 p 23

[Article by Claire Blandin; first paragraph is LE MONDE introduction]

[Excerpts] Industrial research and innovation will henceforth be the new keynotes of government policy. The 1987 Inova exhibition, devoted to innovation and to technological development, which will be open until 25 April at the Science and Industry Center at La Villette, should confirm the return to favor of these themes. Alain Madelin, minister of industry, and Jacques Valade, minister delegate in charge of research, who opened the exhibition, recalled that they would prepare a joint statement on research and innovation for presentation at a forthcoming cabinet meeting. Madelin made clear that there will be no supplementary tax deduction for companies introducing innovations but rather "an easing of their tax burden."

The statement of the need for a policy of innovation is not new. All ministers of industry have sooner or later discovered the virtues of this process which, emerging from the mind of a researcher, makes it possible to end up with a product which can be sold. Certain ministers have even taken action in this regard, such as Andre Giraud, who set up a system of assistance for the introduction of innovations in 1979. However, a review of the situation by the present authorities is more than ever necessary at a time when the competitiveness of French industry continues to deteriorate. Above all, it is all the more remarkable that barely a year ago, at the time of the presentation of the overall budget in April 1986, these same authorities cut 40 percent from the allocation for ANVAR (National Agency for the Implementation of Research), in the name of providing assistance for innovation.

However, France cannot afford to drag its feet this way, since it is behind in terms of industrial research. The R&D budget expenditures of French industry only amount, in fact, to 1.3 percent of the GDP, compared to 1.8 percent in Japan and the FRG, and 1.9 percent in the United States.

In addition to being inadequate the French effort is also badly distributed. France is concentrating three-fourths of its research expenditures on six sectors: electronics, aeronautics, automobiles, chemistry, pharmaceuticals, and energy. By doing this it is even neglecting the more traditional branches

of industry. The research efforts of Japan and the Federal Republic of Germany are very different. These two countries are earmarking 14.9 and 18.4 percent, respectively, of their industrial research to metallurgy and the mechanical engineering industry, respectively, whereas France only devotes 6.4 percent of its industrial research to those sectors.

French companies are also behind and sometimes to a substantial extent, depending on the sector, in terms of the number of research personnel. A comparison with the United States leads to the conclusion that French companies are "at the same level" in pharmaceuticals, petroleum, data processing, telecommunications, or aeronautics. However, on the other hand, they have two times fewer research personnel in such sectors as chemicals, steelmaking, electrical engineering, and instrumentation. They have from two to five times fewer research personnel within the areas of farming and food-production, textiles, plastics, metals, mechanical engineering, and electronic components.

Foreign Aid

As an OECD study on "Innovations Policy in France" emphasized, these nharacteristics of national industrial research are only a reflection of the efforts undertaken by successive French governments, which have always given priority to the major technological programs with a single client--the government--such as the nuclear, space, or aeronautics industries.

Without neglecting these strong points in French research, government action regarding innovations should henceforth draw its inspiration from foreign examples which are more directed toward small or medium sized companies. For not a single country, however liberal it may describe itself, refrains from operating in this area.

Strengthened ANVAR

In light of these different ways of handling innovative research, the French government is considering the redefinition of its activities regarding innovations. The existing institutions will be continued and even improved. The role of ANVAR will be strengthened, and the 1988 budget may be more generous to this agency than the 1986 and 1987 budgets. Meanwhile, thanks to the reappropriation of innovation assistance provided in previous years, ANVAR should distribute about Fr 840 million in 1987 (of which 700 million will go to companies with less than 500 employees), despite the fact that its budgetary allocation this year has been reduced. Tax-research loans, which more than doubled in 1 year, from Fr 477 million in 1984 to Fr 1,056 million in 1985 (a figure which was only made public at the beginning of 1987), will be continued.

The system, which has already been extended for 1 year, will probably be terminated by the end of 1988. Prime Minister Chirac himself announced its extension (see LE MONDE of 25 March). It should be improved by no longer using as its foundation the growth of the research budget from one year to another, but also by starting it off on the basis of a certain level of expenditure.

However, government policy should also be directed along three other lines: facilitating the transfer of research personnel to industry and particularly to small and medium sized companies; allowing major technical programs to have a real impact on the industrial structure; and encouraging major public organizations and private companies to work together more closely on research programs. Certainly, this is not the first time that such intentions have been expressed. However, foreign examples prove that they can be applied in concrete form. After 1 year of "less state activity" the government is beginning to realize in any case that it is a matter of keeping French industry in a position where it is able to meet international competition.

5170
CSO: 3698/424

VALADE OF FRANCE BACKS AMENDMENT ON HIRING SCIENTISTS

Paris LE MONDE in French 28 May 87 p 15

[Text] Mr Jacques Valade, Minister of Research and Higher Education, must take advantage of the discussion on 4 June in the National Assembly of the law concerning various social provisions, to put forward an amendment validating all the acts related to hiring of scientists by the National Center for Scientific Research [CNRS] for 1986. This solution, which was recently suggested to the Minister by the Council of State section on liaison and studies would enable the establishment to put an end to a situation which has partially paralyzed its function for a little more than a year.

If the Parliament goes along with Mr Valade, the hiring of personnel for the year 1986 could finally be completed before the month of August. After long months of legal quibbling paid for by the researcher applicants, this would basically put us back to the situation prevailing last spring when the admission committees were preparing to hire the new researchers. As Mr Valade says, it is true that "we cannot forever lock ourselves into absurd situations and suggest solutions that are more reminiscent of games of chance than pragmatism." But, paradoxically, of the amendment were passed, it would amount to a validation of the list of "eligible" scientists established by committees, which according to the Council of State were elected under unusual circumstances.[1] (Footnote 1) (This legislative solution was proposed last year by the socialist deputy from Hauts-de-Seine, Mr Philippe Bassinet.)

It all began in May 1986. The procedure for hiring deputies and research directors at the CNRS was in full swing. Some 750 candidates were still in the running to fill the approximately 520 positions opened for the competition. These "eligibles" had to go through one last stage in order to go to work at the CNRS. However, the mechanism suddenly jammed because of the outcome of a petition filed before the Council of State three years earlier by the Independent Union of Teachers of Medicine.

In a decree published 12 May, the Council of State in effect cancelled one of the articles of the decree establishing the manner of election of the National Committee of the CNRS, a veritable "research parliament" (cr. box). According to certain parties, this text, which was made public 16 June, left open the possibility of continuing the hiring process. However,

Mr Alain Devaquet, who was Minister of Research at the time, decided otherwise, being of the opinion that "the National Committee could no longer meet regularly." As a consequence, the work of its various sections was "immediately and definitively interrupted" as was that of the "committees working on hiring competitions for scientists."

[Boxed item: The National Committee of the CNRS, consisting approximately of two thirds elected members and one third appointed members, is composed of 45 sections representing all of the disciplines covered by the CNRS. Eight of these, where the problem lies, are concerned with the life sciences. This body is in charge of evaluating laboratory and personnel work in the organization. It also participates in the hiring of scientists to the extent that the individuals who make up the committees on eligibility and admission are recruited from it.]

Unburdening the System

So as not to penalize future scientists excessively, the CNRS administration, in concurrence with Mr Devaquet, proposed offering a temporary one-year contract to three hundred and forty-five eligible candidates. This is slim consolation which in no way dealt with the hea t of the problem. This was emphasized by the candidates, who were grouped together in a "collective", and also by a number of renowned scientists. During the same period, two researcher unions (SNCS-FEN and SGEN-CGT) appealed the ministerial decisions with the "wise men" at the Palais-Royal. This in no way helped the situation. Eight months passed.

In February 1987, another dramatic event occurred: The Council of State repealed the decision by Mr Devaquet which suspended the work of all sections of the National Committee. The Council decided, in effect, that only the selections involved in the establishment of the life sciences sections were illegal. Having thus in part indicated to the unions that they were right, Mr Jacques Valade, Mr Devaquet's successor, was able to resume some of the hiring (LE MONDE, 7 March).

Although it was received with relief by the interested parties, this decision left two problems unsolved: the hiring of young biologists and physicians for the life sciences and hiring of research directors for the CNRS as a whole. The nomination of the latter category of personnel, in effect, requires the meeting of a single admission committee which would encompass individuals from all the sections of the National Committee, including the contested sections, viz. the life sciences.

To get out of this tight corner without being threatened by new petitions, the Minister of Research decided to seek counsel from the "wise men" at the Palais-Royal at the end of March. The latter responded rapidly and submitted their opinion, signed by their vice president Mr Marceau Long on 30 April--not a current happening. The five-page text shows that there are now two solutions available to the Minister.

The first one, which is of an administrative nature, appeared "entirely inapplicable" to the experts to the extent that, in order to be legally guaranteed, all elections of National Committee members would have to be repeated. This would take months. On the other hand, the second solution has the merit of rapidity and assumes the deposition of a legislative text by the government. In fact, it has been suggested to Mr Valade to propose to Parliament "a draft validation law which could be limited to acts and operations necessary to the resumption and completion of the competitions under legal conditions." In other words, operations would be resumed at the point where they were curtailed in spring of 1986 and a new beginning would be made as though nothing had happened.

Under the best of circumstances, this race against the clock for the 1986 recruitments could be finished in July, which would leave the CNRS time to set up the new National Committee as well as the committees in charge of hiring scientists for 1987.[2] (Footnote 2) (For 1987, there are nearly 425 positions for deputies and research directors to be filled: 325 by outside recruitment, 100 by temporary reassignment.) Consequently, the scientists retained for this year could be named at the beginning of November, which would be only one month behind the usual schedule. What a relief! The CNRS has avoided a catastrophe which is due partly to the delicate functioning of its National Committee.

7072/9835
CSO: 3698/494

FRENCH FIND DIFFICULTIES IN EUREKA FUNDING

Paris LE FIGARO in French 12 Jul 87 p 21

[Article by P.K.: "Eureka's Adolescent Growing Pains"]

[Text] The cost of success for Europe's large projects is so high their continuation will require public funding. France is seeking solutions.

The Eureka program, kicked off by a huge publicity campaign in April 1985, and officially christened during the Technology Conference in Paris in July of that same year, is still going strong. Since the December 1986 ministerial conference in Stockholm, however, it is doing so with much less fanfare.

This might suggest a loss of momentum. Nothing could be further from the truth, since projects are being developed and are taking shape bit by bit. Eureka could almost be compared to a happy couple, free of problems: there are currently 109 projects, 61 of which involve French participation. That is assuredly the highest rate of participation within the 19-member Eureka conference, ahead of Great Britain, Italy and the Federal Republic of Germany.

The scale of these 109 projects ranges from several million to several billion French francs. Half of the projects fall in the range of Fr 10-200 million, 40 percent within the range of Fr 200 million to 1 billion, and 10 percent require more than 1 million. The total funding involved amounts to accumulated revenues and expenditures of more than Fr 60 billion. This should jump to 100 billion after the Eureka stamp is given to 50 other projects at the conference of ministers in Madrid next 15 September.

Eureka's performance has surpassed all expectations and has even succeeded in converting British industrialists into its most ardent defenders. With the ample demonstration of Great Britain's reluctance to support the EC organization at the European Council just concluded in Brussels, one cannot help seeing in Eureka another way, a more flexible, pragmatic and above all efficient one, of constructing Europe.

Eureka's detractors argue that the accumulation of a multitude of small projects will not create the industrial and technological fabric Europe needs. One possible rebuttal is that alongside relatively low-cost projects--the oxodipine project, for example, a 40 million franc research study to develop a

medication for the treatment of cardiovascular disease, a joint venture of a French company, Setif and IOB, a Spanish company--are very large-scale projects whose role in structuring R&D in certain sectors is fundamental. Their success will condition industrial and marketing strategies not only in Europe, but throughout the world. To cite only two examples: the wide-band digital switching project (a cost of 1.2 billion francs), a joint endeavor of Alcatel in Plessey and Italtel, to develop the famous box of interconnections which will enable voice, images and data to be transmitted by a simple telephone line. The first one to make it to market with this product in less than 5 years has every chance of maintaining his lead over competitors. The second example is the Eureka high resolution television project, which aims to establish the Mac Paquets standard adopted by the Europeans at the Dubrovnik conference in 1986 at the expense of the American-Japanese standard. Thomson is working with Philips and Bosc on this nearly Fr 1.5 billion project.

Global Scale

A host of examples could be cited. One unique offshoot of the Eureka marriages is the ES2 project--European Silicon Structures: Bull, Philips, British Aerospace and Olivetti have created an ad hoc company to supply studies and designs of high dissipation integrated circuits. From its inception, this company has benefited from multinational capitalization and management, giving it instant access to a market which is more than national, or even European, but world-wide. This new concept does not view participation in a Eureka project as a means of creating some mythical Europe, but as a way of acquiring right off the bat equal weapons in a competition which is global.

These positive results of the Eureka process should not be allowed to obscure the adolescent growing pains that the program is sure to face in the coming months.

Funding is the first problem to be solved. Until now, the exact details of the government aid granted to Eureka projects have remained hazy. There is no common rule and each state is free to participate as it sees fit in the funding of projects in which its companies are involved. In France's case, a summary evaluation disclosed a rate of public funding of slightly more than 30 percent of the total cost of the projects.

The Brussels Commission has until now granted total political immunity to this type of aid, considering it aid to research. It is beginning to take a sharper interest and would eventually like to be able to make certain these subsidies do not distort competition between companies benefiting from them and companies conducting identical research outside the Eureka framework.

Favoring Priority Market Outlets

The problem of public funding will become acute for France within a year. In 1986, approximately Fr 350 million in public monies were allocated. Since Eureka projects extend over periods of time ranging from 3 to 7 years, this sum will have to be renewed annually, in addition to new projects which will also be extended the following years. Without knowing exactly which projects

involving French participation will be adopted into the Eureka fold in Madrid next September, financial needs for 1987 can be estimated at Fr 650 million, which will automatically grow to Fr 900 million in 1988.

To check this inflationary mechanism, at a time when the government is cutting aid of all kinds to industry, Mr Madelin has begun a process of deliberation with the French Eureka coordinator, Mr Yves Sillard, CEO of Ifremer, and a group of banks and financial institutions. They hope to submit proposals on ways of increasing private funding of Eureka groups in Madrid.

An initial solution considered by the Germans and supported by the current Spanish president would be to apply venture capital methods to Eureka projects. Apparently, this idea has little chance of success, given that Eureka projects are much longer range than the time-frame favored by venture capital companies and that the latter, by definition, intervene by participating in the company's capital, which would raise the problem of the orientation and autonomy of the company.

The solution would seem to be insuring for technological risk-taking: at the present time, no insurance company covers the risk taken by a small or medium business when it becomes involved in a research project further complicated by the presence of a foreign partner. If at least a portion of the R&D investment risk borne by the company were covered by some form of insurance, the number of small and medium businesses and industries willing to "take the plunge" could be expected to rise sharply compared to current levels. Commitment of its own funds and indebtedness would be less of a penalty for the company and would allow the state to justify its cutbacks in public funding.

The second set of problems to be resolved concern the famous accessory measures intended to strengthen the industrial fabric by eliminating the market balkanization which creates a handicapping surcharge for companies. The products resulting from Eureka projects are supposed to benefit from automatic access to the public markets of the member-states. At the present time, no arrangments have been made, although the problem will crop up within a year. The same is true for standardization regulations.

None of this seems to lessen the Eureka program's attraction for companies, which, on the other hand--and this is especially true for small and medium size businesses, have difficulty understanding the tortoise-like speed and agility with which the administrations implement funding decisions made at the ministerial level.

9825
CSO: 3698/574

FRG, PRC BEGIN ELECTRONICS, COMPUTER COOPERATION

Duesseldorf VDI NACHRICHTEN in German No 25, 19 Jun 87 p 49

[Article by Irmgard Gretscher: "Far East Technology Transfer: German-Chinese Cooperation--Liaison Bureau Opened for Electronics and Information Technology;" first paragraph is VDI NACHRICHTEN introduction]

[Text] VDI NACHRICHTEN, Berlin, 6/19/97--The PRC and the FRG now have the opportunity to improve their cooperation in the fields of electronics and information technology. A liaison bureau for electronics and information technology was recently opened in Beijing and in West Berlin, where four Chinese and two German employees will work closely together.

At the initiative of the Chinese Ministry of the Electronics Industry and the German Federal Ministry for Research and Technology, liaison bureaus were opened in Beijing and in West Berlin, which should promote cooperation in the field of electronics and information technology.

The main function of this bilateral institution will be consultancy, arranging contacts for technology transfer, and the search for suitable cooperation partners on behalf of research and development institutions as well as industrial concerns in both countries. It will also arrange places for training and exchanges of experts within the framework of cooperative projects, organize scientific and technical seminars and exhibitions, and handle contacts in connection with informational visits and cooperative projects.

Sponsoring the institution are the PRC's Institute for the Electronics Industry in Beijing whose vice-president, Zhang Fuliang, took part in the opening ceremony in Berlin, and the information technology center GmbH in Berlin of VDI/VDE [Association of German Engineers/Electronic Engineers]. In both bureaus, four Chinese and two German employees work closely together.

"It is a completely new form of cooperation from which we can expect optimal problem solution in the interest of both sides," said Yang Quanshu, manager of the Berlin bureau. She indicated that electronics has great significance for her country and that a special role will be reserved for technology in the next 5-year plan.

Dr Wolf-Dieter Lukas, who officially opened the Berlin bureau on behalf of the Federal research minister, stressed once again the wish of both states to expand their scientific and technical cooperation in the field of electronics. "The bureaus have already achieved their first important work, for example, in the preparation of the German-Chinese electronics week, to take place in Beijing in July 1987, and in the establishment of a working group for gate arrays."

The objective of investing working energy only in very concrete projects "in order to place technology transfer on a realistic and effective basis", was underlined by Klaus P. Friebe, managing director of the VDI/VDE Information Technology Center Ltd. He said that the roughly 200 projects referred to the bureaus from the Chinese and German sides could not all be achieved if a good quality of work was to be maintained.

The German side felt obliged to provide quality, since as Friebe explained, the FRG today has a very good international standing in electronics and it is worth protecting this image. The performance of German enterprise can be approximately expressed in the export figures, which in 1986 were 300 percent higher per capita than that of the United States and 100 percent higher than Japan's.

The Berlin bureau's target group is middle-size industry. State Secretary Dr Wolfgang Watter from the Berlin Senate Committee for Economy and Employment also appealed to Berlin entrepreneurs and businessmen "to make the most intensive use possible of the German-Chinese liaison bureau for cooperation with Chinese partners." According to a statement from Klaus P. Friebe, technology transfer has reached an economic dimension that is not, however, cost free.

The Chinese and German ministries each finance the bureaus with about DM1 million per year. For businesses and institutes that want to participate in projects, the service is without charge. For the time being the work of the bureaus is fixed for 2 years, with the clear intention of both sides to extend their activity beyond this period should they be successful.

8702
CSO: 3698/M319

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CSO: 2502/80

HUNGARY: PSA-21, PROGRAMMABLE, FFT-BASED SIGNAL ANALYZER

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1987 p 1-26

[Article by Istvan Kerese and Istvan Kollar]

[Excertps] Developed from the MMT system, the PSA-21 signal analyzer is suited for measuring the following characteristics of the signals examined: time function, auto- and cross-correlation function, auto- and cross-covariance function, probability-density function, probability-distribution function, amplitude spectrum, performance density and cross-performance density spectrum. The measurements can be programmed and the possibility is there for the exponential or quasilinear averaging of the results of several measurements, and also for the use of several kinds of window functions in the case of spectrum measurement. The quantitative evaluation of the measurement data is supported by scaling the figures in physical units and by interactive marker operations.

Introduction

These days, increasingly more areas of technology employ measurement techniques and measuring instruments which were employed earlier on a very narrow scale, primarily in scientific research. These are, among others, spectrum analysis and correlation measurements using spectrum analyzers and signal analyzers. The distinction between the two names is gradually becoming meaningless because, with built-in intelligence and increased computer capacity, most instruments are becoming more-or-less universal.

For the analysis of electric signals, two instruments of general utility were produced in Hungary to date: the instrument designated as model 43200 produced by the Factory for Electronic Measuring Instruments [EMG] and designed by the Central Research Institute of Physics [KFKI]; and the OMC type 105 Fourier analyzer, developed by the Budapest Electroacoustics Factory [BEAG] and the "PONT" Small Cooperative for Automatization and Measurement Technology <1>.

The former was produced in the early 1970's to be used for measuring amplitude probability functions, impulse distribution functions and, with the help of the built-in ring modulator correlator unit, auto- and cross-correlation functions. The instrument is capable of averaging the measurement data and, with its wired Fourier transformer, also of measuring spectra; however, its

handling is difficult, it is not sufficiently reliable, and it provides virtually no support for the quantitative evaluation of the measurement data.

The OMC 105 analyzer performs the measurement of the time function and the spectrum of the signals to be measured by means of microprocessor-based hardware. The design of the instrument provides for convenient handling and the built-in BASIC interpreter provides effective support for processing the measurement data; its drawbacks are that the instrument cannot measure correlation, covariance and amplitude probability functions and it also cannot determine the combined characteristics of two signals (cross-correlation function, cross-performance-density spectrum, etc.).

Except for the above two, to our knowledge, no signal analyzer is available on the entire socialist market. In the GDR, the family of MFA-100 signal analyzers and in Hungary, the EMALOG GMK spectrum analyzer named Stochastic Computer are in the state of development but the start of their manufacture remains uncertain.

Specification Aspects of the PSA-21 Signal Analyzer

In view of the fact that there is no easily handled signal analyzer of domestic or socialist make, equipped with an intelligent operator interface and, at the same time, designed for general usage; and, in addition to the considerable foreign currency requirement, the purchase of such type of instruments available on the Western market is also made difficult by the embargo regulations of recent years; the thought has arisen to develop a universal signal analyzer. The main requirements for the planned instrument were as follows:

-- analysis in the time-, frequency- and amplitude range;

-- achievement of as good specifications as possible with the given hardware by using results of measurement theory <2, 3>;

-- provision for both the exponential and linear averaging of the measurement data;

-- provision for the programmed performance of measurement instructions;

-- ease of handling, intelligent operator interface achieved with built-in functional keyboard and monitor;

-- measurement data scaled in physical units;

-- possibility for attaching an X-Y recorder to facilitate the evaluation of the plotted measurement data.

Because our previous experience involved the development of only special purpose analyzers (for example: myograph, EEG analyzer), and because the price of the instrument to be designed had to be kept at a level affordable by the potential users, we did not want to compete with the high-performance Western spectrum analyzers (HP3582A, B&K 2034, Takeda-Riken 9305, etc.) by designing

an extremely complex--and therefore costly--instrument. We wanted to develop a relatively inexpensive, easily handled instrument. Therefore, the analyzer is built on the hardware-software elements of the MMT microprocessor application technical system <8> and contains only minimal supplementary elements. Services not generally needed were left out, such as, for example, band selective Fourier analysis (zoom-FFT), high processing speed, remote controllability through the IEC bus or a serial port, the possibility of computer-like programming of the follow up processing, an "anti-aliasing" filter and a programmable input amplifier. Some of these can be built in later but the user--who may not need these--may wish to do without them because of the relatively low price. At the same time, the various measurement functions (time function, auto- and cross-correlation or covariance, amplitude spectrum, power density spectrum, probability-density function and probability-distribution function), and the simple operator interface insure manifold utility.

Based on the above considerations, the prototype of our PSA-20 signal analyzer was completed in the summer of 1985 and it was used for two semesters--in a university setting--in laboratory exercises in order to gain practical experience. After making the necessary changes based on the gained experience, the final instrument, designated PSA-21, was completed by May 1986 (figure 1).

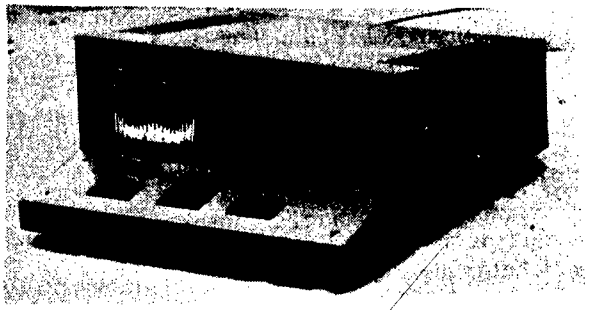

Figure 1. The PSA-21 programmable signal analyzer

Build up of Hardware and Software

The signal analyzer is built basically from elements of the MMT microprocessor application technical system <8>; the hardware contains the following modules:

-- central unit card with a Z80 type microprocessor;

-- 40 kbyte ROM, 18 kbyte RAM;

-- timer and pre- operating card;

-- input card with 2 db A/D converter;

-- graphic display card (256 x 512 dots);

-- alphanumeric display card (16 x 64 character positions, 128 types of character).

The apparatus is operated via a keyboard consisting of 26 pushbuttons; the results appear either on the built in monitor or on a TV equipped with a video signal input connection from the outside. As a consequence of the hardware construction of the analyzer, not only the control but also the signal processing functions of the apparatus had to be provided through software (there is no hardware correlator, averaging card, etc. in the MMT system); consequently, after working out the detailed specifications and system design, development of the apparatus consisted mainly of program writing.

Those parts of the program that runs the analyzer which are associated either with the control structure or with the processing of commands coming from the pre- operating card and, therefore, their running time is not critical although they require the building of complex procedural and data structures, were written using a high level programming language (PASCAL-S) to support effective development; while the signal processing routines that are relatively simple, although demanding in terms of running time, were written using Z80 assembly language. Both programming languages are part of the real time technology of the MMT software system <9> which supports parallel programming by the synchronization of parallel processes with flags and by the mutual exclusion of simultaneous access to shared sources of power. The program of the apparatus was developed using this technology, its length being about 39 kbyte.

Operator Interface

In the interest of making the machine user oriented, a "multi level" operator interface, often used in modern measuring instruments, was developed as a result of which the apparatus can also be used by an operator with relatively little training, to solve simpler problems. A more highly trained operator can also perform more complex measurements by using services not yet available at the "basic level."

In the interest of dividing the operator interface into several levels, the machine has two modes of function: In one of them, the available functions appear as commands carried out directly, it is called COMMAND mode of operations and represents the lower level. The higher level is provided by the other, PROGRAM, mode of operation where a programmed performance of the functions is possible. In the interest of operational simplicity, the syntax of the program commands is the same as the commands of the COMMAND mode of operation although the commands designed to support the program organization appear separately from the others.

Selection of commands is done with the help of a menu system; in the PROGRAM mode of operation, the created program also appears on the screen alongside the actual menu <figure 2>. There are three menus and the third contains the commands which are available only through the PROGRAM mode of operation.

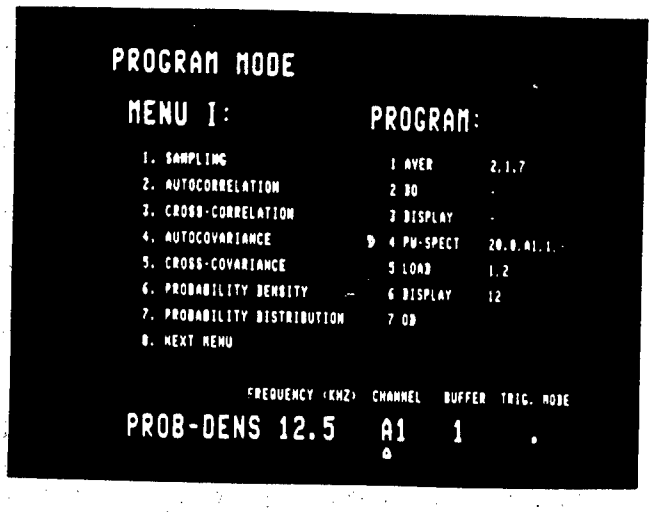

Figure 2. The PROGRAM mode of operation

The analyzer can be used to measure the following characteristics of the signals to be examined:

-- time function,

-- auto- or cross-correlation function,

-- auto- or cross-covariance function,

-- probability-density function,

-- probability-distribution function,

-- amplitude spectrum,

-- power density or cross-power density spectrum.

The PROGRAM mode of operation of the machine provides the operator with the possibility to average the results of his measurements in an exponential or quasi-linear manner (the latter, iterated through a series of exponential averaging, represents, for all practical purposes, linear averaging). The developed measurement programs can be saved in program storage which preserves its content even when the machine is shut off. The commands arriving from the pre- operating card are checked by the analyzer; if it finds them faulty, it writes an error message on the screen. In the interest of effective operation of the machine, the instrument not only detects the commands erroneously given by the operator, but it also facilitates their correction by designating the place and type of the error.

The measurement results appear on a screen with a 256 x 12 dot resolution. The instrument provides for not merely one, but for the simultaneous presentation of two different functions on the screen. In the vertical direction, the functions are always scaled to the size of the available screen, that is, they try to fill it while maintaining their relative dimensions.

Possibilities for Application

On the basis of its technical characteristics, the analyzer is suited for the examination of not overly rapid signals (below 10 kHz). We are presenting a few examples of possible practical application.

-- By measuring the cross-covariance function, signal delays can be directly determined, even in a noisy environment, between about 0.5 msec and 200 sec, for example to measure flow rates indirectly, for localizing sources of sound and for other studies involving sound propagation and acoustical insulation.

-- The distortion measurement of sinusoidal sound frequency signals can be easily carried out by examining the spectrum of the signals. The large dynamics and flat main wave of the built-in, so-called Flat Top window make it possible to determine the amplitude of the dominant overtones with an error less than 1 percent (at 0.1 dB). The corresponding value is 15 percent (0.7 dB) in the case of the Hann window and 36 percent (3.9 dB) in the case of the square window.

-- The spectrum measurement provides a possibility to examine rotary machines and other mechanical systems exposed to vibration, to determine resonances and to check an eventually built-in anti-vibration mechanism.

-- By means of spectrum measurement, fluctuations in the revolution of mechanical and electromechanical systems (for example: magnetophones, record players) can be determined in excess of an 0.5 percent frequency fluctuation.

-- With a suitable pre-amplifier, it is easy to measure the EEG signal spectrum and thereby the performance of the individual alpha, beta, delta, and nu activities.

-- The diverse functions and ease of operation also make the signal analyzer suitable for practicing basic stochastic measurements. In the measurement technical exercises and demonstrations of academic and university laboratories, the PSA-21 is a very useful tool.

Further Development

Since May 1986, the PSA-21 signal analyzer has been manufactured by the Texelectro Industrial Cooperative. Although the instrument is very useful already in its present state, the thought of its further development (subject also to consumer demand) has arisen, its possible main trends being as follows:

-- development of a hardware FFT-generator;

-- development of a hardware correlator;

-- development of a programmable dither generator to compensate for the non-linearity of the A/D converter;

-- development of a signal receiving card containing a programmable amplifier, programmable filter and multiplexe[;

-- development of a faster (at least 100 kHz) A/D card;

-- adaptation to an IEC surface.

Istvan Kerese

I was born in 1960, in Budapest. I received my degree from the Faculty of Electrical Engineering of the Technical University in Budapest in 1985; subsequently, I participated in a three and a half month long production training in Japan where I was engaged in software debvelopment at the Development Section of the Ricoh Company, in Tokyo. Since December 1985, I have been working in the Department of Instrument and Measurement Technology of the Technical University in Budapest as an assistant professor. The principal field of my interest is the planning of measuring instruments and data collecting systems controlled by a microprocessor and having an intelligent operator interface, and the preparation of their control program.

Being single, my free time is spent among my friends, in the winter I ski, in the summer I am bumming around abroad, and my hobby is to play the guitar in the avant-garde band: "Szep ruhak."

Istvan Kollar

I was born in 1954, in Budapest. In 1977, I received my degree from the Faculty of Electrical Engineering, Instrument and Guidance Technological Section of the Technical University of Budapest. I have been working since then in the Department of Instrument and Measurement Technology of the Technical University of Budapest, with the rank of adjunct professor. My principal field of interest is the measurement technology of stochastic signals, digital data processing and the design of microprocessor instruments. My candidate dissertation entitled: "Measurement Theoretical Study of Fourier Analyzers" was defended in 1985.

I am married, have a three and a half year old son and a two year old daughter. I would like to spend my free time mostly with them if I would not have to lead a mostly private collective of canalization construction in our district.

2473
CSO: 2502/80

HUNGARY: NEW SCANNING LASER BEAM FOR DIAMETER CONTROL

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1987 p 9

[Article by Gyorgy Akos and Istvan Hejjas

[Excerpt] Developed at the Enterprise for Measurement Technological Development, Research Institute of the Instrument Industry [MIKI], the scanning laser-beam measurement control instrument, developed under the type designation DG-50, is used primarily for measuring the outer diameter of cylindrical objects, in the nominal range between 1-50 mm, without touching them. The object to be measured can be either solid or transparent (for example, glass tube); it can be stationary or can move along its longitudinal axis (for example, measurements on a coiler tension rolling mill) during measurement. In the latter case, the measurement range is decreased in proportion with the sample's amplitude of oscillation perpendicular to its longitudinal axis.

Functions of the Installation

-- Continuous measurement and recording of the external diameter.

-- Control signal to the classification installation from the quality control section.

-- On the basis of the deviation from the nominal diameter, issuance of a signal formed using PID algorithm for purposes of a feedback for thickness regulation.

The instrument fulfills its specifications if, in the course of the crosswise movement, that is, oscillation of the sample, none of its contours leave the 50 mm measurement range and its oscillation frequency is no more than 10 Hz.

Based on the deviation from the nominal measurement, the (cut) rods or tubes are divided into three classes by the instrument:

Class 1: deviation $< h_1$ on any part of the sample.
Class 2: $h_2^1 <$ deviation $< h_2$.
Reject: $+h^2 <$ + deviation or
$-h_2 <$ - deviation.

The h^1 and h_2 tolerances can be programmed between 0 and 0.99 mm. On the one hand, the instrument signals the class of quality and, on the other hand, is provides a remote control signal for the automatic classification of the cut up rods or tubes. The remote control signal is delayed. The extent of the delay is a function of the rate of progress of the rod or tube, and the distance between the measuring apparatus and the classification site. In order to detect the rate of progress, external synchronizing impulses must be related to the apparatus.

As a function of the deviation from the nominal measure programmed into it, the instrument also provides a PID-regulating exit signal for the technological process for feedback purposes. The range of changes in the regulatory output is between 4 and 20 mA; the null signal is associated with a 12 mA current.

Principal Elements

The instrument consists of three main elements (see figure 1):

-- the measuring unit contains the laser sender and receiver units. This unit should be located near the manufacturing technology in order to keep the time delay of the feedback as small as possible;

--the control unit contains the electronics performing the processing of the measuring signals, the evaluation of the measurements and the formation of the regulatory signals. The same unit performs the functions of output and data input. The role of the instrument in the rod or tube manufacturing process is presented in figure 2. The control unit works with microprocessors;

-- the long distance output and classification unit is located near the cutting installation. Its purpose is to issue the control signals of the classifier and to put out the regulatory information.

The connection among the units was accomplished with the help of cables.

Figure 1.

Key: 1. Remote output and classifier unit
2. Control unit
3. Measuring unit
4. Tube

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MAGYAR ELEKTRONIKA, TABLE OF CONTENTS

Budapest MAGYAR ELEKTRONIKA in Hungarian No 5, 1987 p 2

On Our Cover

On our cover one can see the 1 kW UHF FM transmitting equipment of the BHG [Beloiannisz Communications Engineering Factory]. Modern, powerful

semiconductor devices make it possible for equipment manufacturers to produce purely semiconductor transmitters. The power of these does not yet reach that of the big transmitters but they can be used well in rebroadcasting stations. Broadcasting can be solved with--locally installed--0.5-1 kW equipment wherever reception conditions are bad because the inhabited area is in the "shadow." The equipment can be used--naturally--to set up any medium power UHF station.

Measurement Technology

There are two articles in our measurement technology section. Both describe devices which their manufacturers are showing at the BNV [Budapest International Fair]. The article by Janos Csardas describes an instrument called DATA MONI and the article by Laszlo Toth describes a multichannel nuclear analyzer.

Computer Technology

In our computer technology section we have put an article by Emoke Kovacs, Istvan Marosi and Andras Toth describing a new development by the SZKI [Computer Technology Research Institute and Innovation Center]. The hardware of the optical page reader consists of a digitizer and a PROPER-16/W personal computer. The authors of the article have developed software which makes it possible to read in typed or printed text. The PC recognizes the characters put in from the page by the digitizer and stores them in the form of codes. It is then easy to further process (text editing, database creation, etc.) the text or textual information recorded on floppy disk.

8984
CSO: 2502/79

HUNGARY: ONE KW UHF TRANSMITTER

Budapest MAGYAR ELEKTRONIKA in Hungarian No 5, 1987 pp 9-12

[Article by Gyorgy Bihari: "One kW UHF Transmitter"]

[Text] In 1986 the BHG [Beloiannisz Communications Engineering Factory] Communications Engineering Enterprise prepared prototypes for purely semiconductor UHF (66-74 MHz or 87.5-108 MHz) one kW transmitting equipment. On this occasion we report on the developmental achievements in this new generation of equipment.

Introduction

The spread of high power, high frequency semiconductors in the 1970's made possible the development of amplifiers with 50 W output power which require no retuning within the band (66-74 MHz or 87.5-108 MHz). New semiconductor devices which appeared in recent years raised the power limit to 500 W and even 1,000 W.

It increased the timeliness of the development that the national UHF main transmitter network is essentially made up of 10 kW or 3 kW transmitting equipment containing one electron tube. The 500 W and 1 kW transmitters can be ideally used for broadcasting to smaller areas or as reserves for the large transmitters. It proves the well founded nature of our developmental goals that the Soviet and GDR postal services showed serious interest in the equipment to be described, which has recently led to the signing of delivery contracts.

Structure of 1 kW UHF Transmitting Equipment

We developed the equipment for two UHF broadcasting bands (66-74 MHz and 87.5-108 MHz) striving to see that where it could be done economically--e.g. for directional couplers--we would use circuit subassemblies suitable for transmission in both bands. We developed the various transmission band dependent subassemblies (amplifier modules, amplifier plug-in units, summing and separating units) so that they could be built from essentially the same circuit elements, thus substantially narrowing the parts assortment.

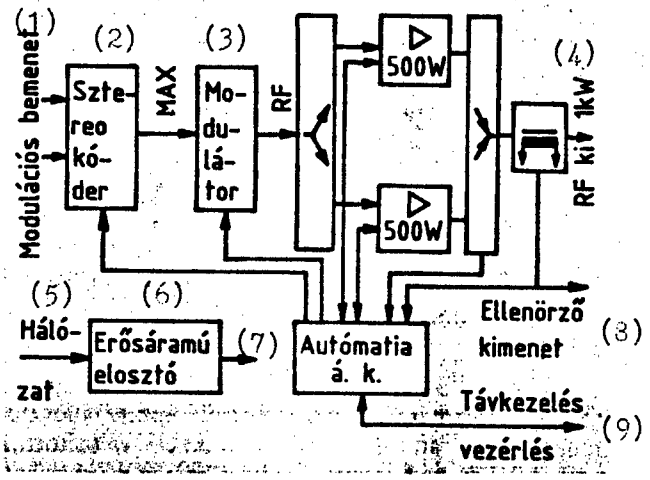
The two equipment types are placed in the same frame and their outer appearance is exactly the same.

A photograph of the equipment can be seen in Figure 1.

Structure and Operation of Subassemblies

We can follow the functioning of the equipment on the basis of Figure 2.

Figure 2.



Key:

1. Modulation input
2. Stero coder
3. Modulator
4. RF output
5. Network power
6. Heavy current distributer
7. Automatic circuits
8. Monitoring output
9. Remote control

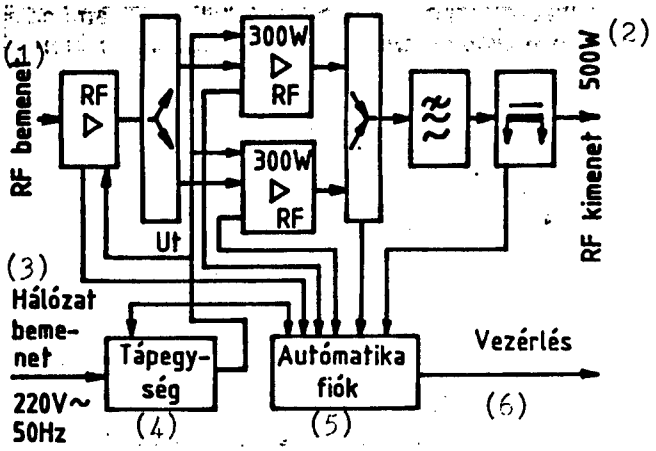
The voice frequency signals of the right and left channels enter the stereo coder through a front panel shortcircuit plug. We do not build in this unit in the case of a mono transmitter. We lead the stereo multiplex signal, or the voice frequency modulating signal in the case of a mono transmitter, to the frequency modulator. This unit produces the frequency modulated carrier frequency signal at the necessary level (a maximum of 50 W).

We developed these two units (as a drive stage of the 3.5 and 10 kW transmitter types containing one electron tube) at the end of the 1970's with such great foresight that they can be regarded as very modern even today, so we concentrated our limited developmental possibility on creating larger power transistorized amplifier stages and modern switching power units for them. A detailed description of the already developed stero coder and modulator can be found in the literature (HIRADASTECHNIKA, No 6, 1978).

500 W Amplfier Plug-in

When developing the unit we tried to make it independently operating while maintaining the simplest structure. With adequate reserves its output power is 500 W, so taking summing losses into consideration one can develop transmitting equipment with 1,000 W output power with two plug-ins and 2,000 W with four plug-ins. The mechanical structure of the unit can be seen in figures 3 and 4 and its block diagram in Figure 5.

Figure 5.



Key:

1. RF input
2. RF output
3. Network power input
4. Power unit
5. Automatics plug-in
6. Control

The RF chain contains two stage amplification. The first stage is built with a Philips BLW 78 transistor operating in the "B" class. We realized its coupling transformers with discrete elements. The 10 W input RF signal is amplified to about 70 W, which is led to a final amplification stage operating with two "B" class counteracting BLV 25 transistors through a 90 degree hybrid separator. The counterphase signals of the two final amplifiers, each with a maximum output power of 350 W, are led through a 90 degree summer identical with the input to a harmonic filter and then to the output directional coupler. A harmonic filter was put into every 500 W stage because this way the output of the unit, in the case of a 500 W transmitter, meets every prescribed specification (including the permitted level of side waves) and the automatics of the unit can sense the actual traveling and reflected power levels so protection and control can be realized very precisely.

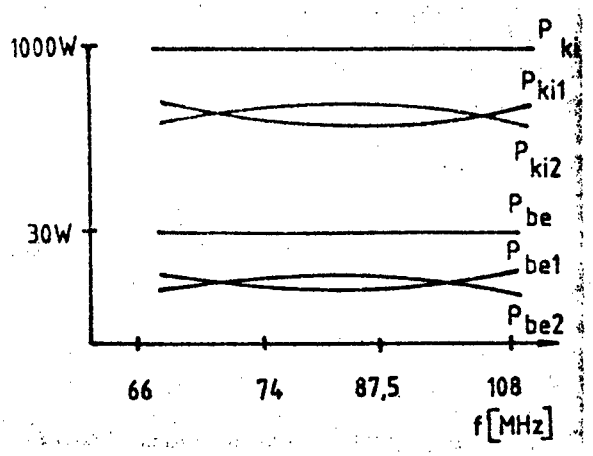
Feeding the high frequency amplifiers with direct current is taken care of by a direct network rectifier switching power unit. We developed the power unit using elements of the type used in a 100 W TV rebroadcasting transmitter, taking into consideration the mechanical, electrical and heat requirements of the unit. We have described the operation of its component circuits in the journal HIRADASTECHNIKA (No 5, 1984).

The units have independent automatics which, in addition to the switching on and off function, regulate the maximum traveling power as set in advance or which can be safely given with optional impedence termination of the high frequency output of the unit. The units are protected in the event of a partial circuit failure or overheating and error signals are provided by the automatics of the transmitting equipment.

Paralleling Unit

In the 1 kW transmitter a paralleling unit separates the output signal of the modulator and sums the 2 x 500 W output. Despite the significantly different powers transmitted the separating and summing circuits are the same 90 degree hybrids. The significant over-size of the separator is justified by parts standardization and a striving for minimal summing loss. One can see in Figure 6 that because separation and summing deviate from the ideal the two 500 W amplifiers get input powers which deviate as a function of the transmission frequency. In the case of a summer built of the same elements and with an appropriate connection one gets a summing error corresponding to the inverse of the above mentioned error, so the two errors compensate one another with a good approximation. The same applies to the phase errors of the elements.

Figure 6.



The traveling and reflected output power of the equipment can be measured at the detected output of the directional coupler located in the unit.

We chose 300 W as the load of the ballast resistance of the summing circuit out of the consideration that operation should continue even when one of the amplifier plug-ins failed. The power going to ballast resistance is:

$P_{bal} = (U_{k1} + U_{k2})^2/2R$ while the output power is:
$P_{out} = (U_{k1} + U_{k2})^2/2R.$

[Note: The first element in parentheses in both equations above bore the subscript "ki" which means "out"; this was changed to "k1" in this translation to correct the apparent typo.]

It can be seen that if a precisely counter-phased voltage with the same amplitude appears at the output of the two amplifier plug-ins then the power at the output of the summer is twice the power of one plug-in while "0" power

goes to ballast resistance. If one amplifier plug-in completely fails then the output power and the power going to ballast is half the output power of one plug-in. If only one BLV 25 stage fails in only one 500 W amplifier plug-in then the output power of the equipment is 1.125 P_{out} while the power to ballast is 0.125 P_{out}, so with half the output power the equipment can continue operation uninterrupted with only 3 dB field reduction until repairs following completion of the program.

Measuring the quality characteristics of the transmitter can be done with outside instruments at the high frequency check points led out. One can also connect to this point a transmitter monitoring unit developed at the BHG; it continually checks the signal intended for transmission and gives an error signal if the transmitter is overmodulated or if a difference greater than the preset value appears between the modulating signal of the transmitter and the detected modulation signal.

Automatics

The equipment can be turned on and off from the front panel of the automatics with push-buttons. The equipment is also suitable for unmonitored operation, so by changing a switch the above functions can be remote controlled.

In addition to the above task the automatics protect the equipment against failure or additional failure when outside or internal failures take place in the following cases:

--network voltage is too low or high;
--the temperature of the air sucked in is too high or there is internal overheating;
--the voltage of the unit automatics is faulty;
--there is a failure in the RF circuits of the unit (ballast overload, reflection).

The independent automatics of the 500 W amplifier plug-ins generate these error signals. The automatics of the equipment store these signals even if network power fails and switch off the equipment as necessary (RF shutdown, complete switch off) in order to avoid further damage. If undisturbed operation can be expected after the error signal ends (e.g., a network power failure) the automatics switch the equipment back on when the failure ends. In the case of other types of failure the equipment goes into a switched off state and it can be switched back on only after pushing a front panel button or when restarting.

In the interest of a high degree of protection all remote control inputs and remote signal outputs of the equipment operate through opto-couplers. In accordance with the requirements of an n+1 reserve system, remote selection among the four previously selected carrier frequencies can take place through the automatics.

Technical characteristics of the 1 kW UHF FM transmitting equipment:

Carrier frequency range: 66-74 MHz OIRT or 87.6-108 MHz CCIR
Carrier frequency setting: in 10 kHz steps
Carrier frequency instability: less than plus or minus 1 kHz/year
Output power: 1 kW
Output impedance: 50 ohm
Permissible operating standing wave ratio: r equal to or less than 1.5
Number of programmable frequencies: 4
Impedance of modulation input: 600 ohm plus or minus 10 percent, or equal to or greater than 2 k ohm ground independent symmetric
Modulation input signal level belonging to nominal frequency stroke: 0 dBm/600 ohm adjustable within minus 10 to plus 30 dB
Pilot signal frequency: 19 kHz
Pilot signal level relative to nominal stroke: 0 to 10 percent adjustable
Fluctuation of amplitude-frequency pitch measured at stereo inputs with pre-accentuation in the 30 Hz to 15 kHz range: plus or minus 0.75 dBm
Harmonic distortion at nominal frequency stroke: equal to or less than 0.5 percent
at a stroke increased by 3 dB: equal to or less than 1 percent
Crosstalk attenuation between right and left channels
at 30 Hz: equal to or greater than 36 dB
at 100 Hz to 10 kHz: equal to or greater than 40 dB
at 15 kHz: equal to or greater than 36 dB
FM signal-noise relationship measured with psophometric filter
mono: equal to or greater than 65 dB
stereo: equal to or greater than 60 dB
AM signal-noise relationship: equal to or greater than 56 dB
Interfering amplitude modulation measured with 1 kHz signal: equal to or greater than 46 dB
Network voltage: 220 V (plus 10 percent minus 15 percent)
Power consumption: 2.2 kVA
Power factor (cos phi): circa 0.9
Transmitter efficiency (P_{RF}/P network): circa 0.45
Operational temperature range: minus 5 degrees to plus 45 degrees Celsius
Storage temperature range: minus 20 degrees to plus 55 degrees Celsius
Installation altitude: maximum 3,000 meters (above sea level)

Autobiographical Note, Gyorgy Bihari

I was born in Debrecen on 18 April 1944. I earned my electrical engineering degree at the Budapest Technical University in 1967. Since 1 September 1967 I have been working in the developmental institute of the BHG Communications Engineering Enterprise, or at its legal predecessor the Electromechanical Enterprise. I received special power electronics training in 1978. Since 1968 I have led the Automatics and Heavy Current Laboratory of the institute. In addition to development of power units and automatics for TV and UHF transmitting equipment the task of the laboratory is systems technology development for UHF transmitting equipment.

8984
CSO: 2502/79

HUNGARY: NEW MULTICHANNEL NUCLEAR ANALYZER

Budapest MAGYAR ELEKTRONIKA in Hungarian No 5, 1987 pp 21-24

[Article by Laszlo Toth: "The New Multichannel Nuclear Analyzer of the EMG (Electronic Measuring Instruments Factory)"]

[Text] Introduction

The development of multichannel analyzers has been influenced primarily by two factors, on the one hand by the character of concrete applications and on the other by the quality of parts available in a given period. The designers of instruments manufactured in series strove to create devices in a given category which were as many-sided as possible and could be used for a number of purposes. The assortment of analyzers offered ranges from portable, battery operated types all the way to laboratory systems. Innumerable versions were created between the two extremes but building in an extended data processing ability was made possible only by a signficant decrease in the price of computer technology devices. Today even devices in the smallest category have data processing functions. The demands made of laboratory systems can be satisfied only by multiprocessor machines. Because of the multiplicity of needs an important property of a multichannel analyzer is its flexibility, which makes it possible to form a task oriented device by expansion or by leaving out certain units. The system of the new analyzer of the EMG satisfies the requirement for flexibility and offers a way to develop a system oriented to the user task, which later can be expanded or modified as desired.

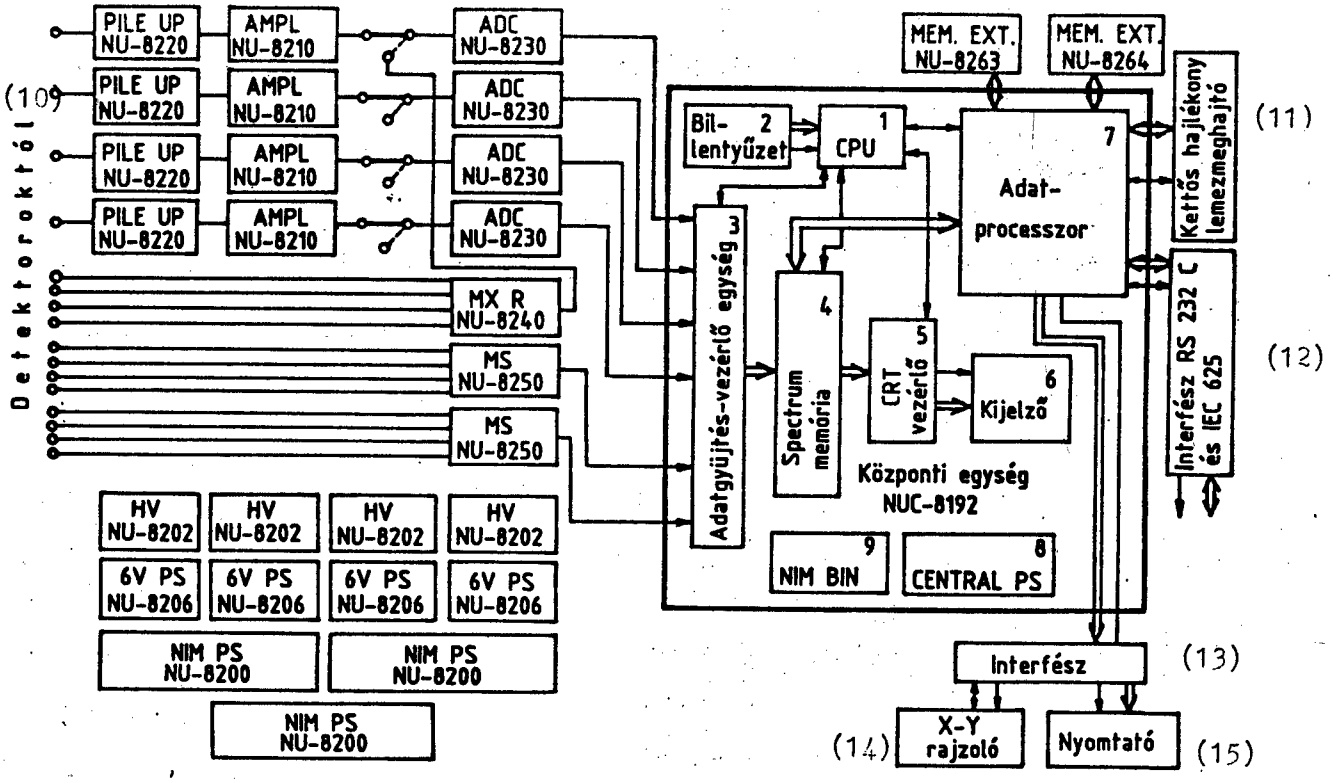
Structure of NUC-8192

Figure 1 shows the block diagram of the NUC-8192 multichannel analyzer of the EMG. Before describing its several elements it would be useful to recall in a few lines the most commonly used operational mode of multichannel analyzers.

Amplitude analysis serves primarily the purpose of gamma spectroscopy. The detectors sensing the radiation--such as a Ge (Li) semiconductor detector--produce electric pulses with an amplitude proportional to the energy of the radiation. During a unit of time the average number of impacts is proportional to the activity of the source studied. After suitable amplification, connected to an analog-digital converter, the digital equivalent of the signal at the output appears as a binary number. The analyzer interprets this binary number

as an address and adds plus 1 to the content of the thus designated cell of memory. So as a final result increasing energies belong to increasing addresses in memory. Displaying the content of the store on a display, its horizontal axis shows the memory addresses and the vertical axis shows the content of the given cell. So one can see the amplitude distribution on the screen, which we call simply the "spectrum" (Figure 2). The peaks which can be observed on it represent the energy lines of the radiating material. Together with the duration of data collection the spectrum thus formed carries all the information collected by the measurement. Data processing handles the content of memory as a database.

Figure 1.



Key:

1. CPU
2. Keyboard
3. Data collection control unit
4. Spectrum memory
5. CRT control
6. Display
7. Data processor
8. Central PS
9. NIM BIN
10. Detectors
11. Dual floppy disk drives
12. Interface, RS 232 C and IEC 625
13. Interface
14. X-Y plotter
15. Printer

In the "multiscaler" mode the increasing addresses of memory represent increasing times relative to initiation at T=0. This mode is suitable for

measuring, for example, the energy of neutrons. The measurement of the energy is based on a measurement of the speed of the neutron. The procedure uses two neutron sensing probes located at a given distance from one another in the path of the neutron radiation. Interrupting the neutron beam in a suitable way and producing an appropriate start signal (T=0) we count for a given time the signals coming from the detectors installed in the "multiscaler" unit. After this time (e.g., 50 microseconds) the analyzer stores the result of the count in the first cell of memory, that after the next 50 microseconds in the second, etc. Two peaks will appear on the horizontal axis of the display. The time between them represents the time of flight of the neutrons from one sensor to the other.

The described amplitude analysis and "multiscaler" mode are examples of creating a database. Modern analyzers interpret the data collected by using computer technology tools.

The EMG analyzer--as can be seen in Figure 1--has a data processing processor which is capable of swift execution of the task.

Course of Processing

A detailed description should be done in the natural order of processing the analog signal.

In the case of pulse amplitude analysis the signal to be processed comes from some sensor (detector). Its amplitude is small, it is generated randomly in time and its signal form is unsuitable for immediate processing by the analog-digital converter. The signal must be appropriately conditioned, which can be done in several steps. First there is a need for amplification, for a so-called semi-Gauss signal forming amplifier which forms and suitably amplifies a signal with a near Gaussian function form from the signal obtained from the detector, which has a fast rise time (about 100-150 ns) and a slow (50 micro) decay time. The time constant for formation must be adjusted to the nature of the measurement. In the case of a large number of impacts it is customary to choose a formation time constant of 1-2 microseconds, and 8-10 microseconds in the case of a small number of impacts. Considering the statistical nature of the signals and in the interest of conditioning the signal with regard to both time and amplitude, one must also take care to restore the base line. The amplitude of a signal seated on a shifted base line is false relative to the "0" level. Seating signals on one another is a phenomenon which also causes a false result, of a different character. As a result of the spontaneous decay of atomic nuclei it happens that two or more nuclei decay at the same time or almost at the same time. If at such a time, for example, two gamma photons from the decay of two identical nuclei enter the sensor at the same time it gives a signal of twice the amplitude as when they enter separately. Since this case cannot be ruled out physically we must prevent the processing of a signal arising from it. The "Pile-Up" sensor takes care of this task. It watches to see if a second or third signal arrives within a given time after the sensing of the momentary signal. If so then it excludes all of them from the measurement. Two units take care of the activity described thus far, the spectroscope amplifier (with built-in base line restoration) and the so-called Pile-Up sensor. Those signals which get through these two units go,

appropriately conditioned, to the input of the analog-digital converter. The digital equivalent of their amplitude appears in the form of a binary number at the output of the analog-digital converter. The converter is also a separate unit.

The central unit of the analyzer is capable of receiving simultaneously the data flow from four "channels," from four different sensors. The measurement channels shut down independently of one another after the set measurement time elapses. The device can be used, from every viewpoint, as four independent analyzers.

It must be emphasized that use of the four channels does not decrease the system's speed of data collection, so it is not the result of a compromise. If, because of the nature of the measurement task, there is no need to exploit the maximum speed but there is a need for four measurement channels then it is useful to use the so-called Mixer/Router. This unit has the property of always passing to the input of the analog-digital converter that one of the signals arriving at the four inputs which arrived first. In this way signals from four sensors can be processed independently of one another using only one analog-digital converter. All the analog units follow the widespread NIM standard; they can be used placed in a box standardized by this standard; and power is supplied by a mounted power unit, also fixed in the NIM standard. This is one of the important guarantors of the flexibility of the analyzer as already noted.

In the multiscaler mode the signal source is again some sensor, e.g. a neutron detector. Data collection takes place in the way described earlier. A single multiscaler unit has four inputs, so it can receive four signal sources simultaneously. In those cases where more are needed the number of inputs can be expanded to eight with a second unit. It is an advantageous property of the multiscaler unit that it works with zero deadtime, so there are no lost signals. Its output also follows the NIM standard.

One can set the parameters of the analog-digital converter, the mixer-router and the multiscaler unit through the keyboard of the analyzer. In addition to leaving out the operating organs this solution has the advantage that one can automatically store the measurement parameters, so they are available to the data processing computer during data processing.

After completion of data collection the content of the spectrum memory can be transferred to the memory of the data processing processor (block 7); this immediately frees the spectrum memory so a new data collection can begin immediately. The data processor can process the data independent of data collection. The CPU (1) manages the keyboard (2).

The data processing unit can be freely programmed in a high level language--BASIC-A. The user can write his own program or he can use the software available on floppy disk. The block diagram shows an ample supply of peripherals--X-Y plotter and printer, with the necessary interfaces. One must especially emphasize the IEC-625 and RS232C interfaces, which make it possible to communicate with other standard devices.

The dual floppy drive is always used; memory expansion can be chosen.

This description could not deal with all the applications possibilities of the EMG NUC-8192; we only wanted to indicate the chief aspects of the capabilities of the system.

Additional units, also in NIM versions, are the stabilized high voltage power unit and the 6 V power unit powering the TTL circuits.

The part of the block diagram shown in Figure 1 which is surrounded by a thick line is the central unit of the analyzer. The data collection control unit (3) receives the data provided by the measurement units and sees to their storage in the spectrum memory (4). During data collection the content of spectrum memory can be observed on the display (6).

Autobigraphical Note, Laszlo Toth

I graduated in physics from the Natural Science School of the Lorand Eotvos Science University. I have dealt with development of nuclear instruments in the developmental laboratory of the EMG since 1955. At the time of the Antonov Program I also participated in the development of electronic medical instruments. Since 1969 I have dealt with the development of multichannel analyzers. I am married and have one child. My favorite pastimes are listening to music and motoring.

8984
CSO: 2502/79

HUNGARY: OPTICAL CHARACTER READER

Budapest MAGYAR ELEKTRONIKA in Hungarian No 5, 1987 pp 25-27

[Article by Emoke Kovacs, Istvan Marosi and Andras Toth: "Page Readers--Fifth Generation Data Input"]

[Excerpt] Domestic Developments and Applications

Domestic users also have a significant need for the page reader function and its integration into a system. The page reader development taking place at the Computer Technology Research Institute and Innovation Center with OMFB [National Technical Development Committee] support is aimed at satisfying these needs.

The hardware base of the system consists of the domestically developed Proper-16 personal computer and page reading equipment developed from the Microtek image digitizer. We developed for this a recognition algorithm working on the countour analysis principle which is suitable for the sure and swift recognition of characters of different sizes and different styles.

The program serves to enter into the computer typed or printed texts--from a paper sheet with A4 maximum size--or numbers written by hand. To run it one needs a Proper-16 (or an IBM PC compatible) with at least 512 K bytes of memory and an image digitizer (scanner) providing a resolution of at least 300 points per inch.

The digital image is produced by an image digitizer operating with CCD elements and with a resolution of 300 dpi. Such a system can read an A4 page (1,200 letters) in 45 seconds (25 seconds for digitizing and 20 seconds for recognition). The size of the letters can range from 1.6 mm to 10 mm.

Recognition Algorithm

We designate the characterizing points in the course of going round the outer contour of the character. These are, for example, 90 degree break points, curves or the end points of long slanting edges. The algorithm which emphasizes the characterizing points--this is the soul of the program--gives far-reaching consideration to the peculiarities of the raster image and can regard variability and the most frequent errors as natural.

We list the selected points into two groups according to whether they are on a concave or convex curve. We compact this information into a 32 bit word, the form code. The form code separates various letter forms very well, but it regards various characters which differ from one another only in size, ratios or tiny details as the same.

The location of the points is less stable. The end points of slanting edges and curves, especially, can move along the contour. Despite this they contain important information which we use as follows: We divide the rectangle occupied by the character into fields and assign the serial number of the containing field to the several points. We produce position codes from these numbers.

The classification is hierarchical. We decide at the first level according to the form code. If we get to a subclass to which several characters belong then further selection is according to position code. Otherwise we only check on the basis of the position code the correctness of the decision according to form code. In the system, which recognizes all Latin letter types used today, the classification tree contains branches according to about 300 form codes. In the case of a simple form 5-6 different position codes belong to one form code; for more complex forms the form code is unambiguous and it has only one position code. The more concave curves a character has the more complex is its form. The classification tree is built up automatically during a run in the "teaching" mode.

The precision of recognition depends primarily on the purity of the image. It is important that individual letters not touch one another, that the line of the letters not be broken and that the holes not fill up. These requirements are usually met in the case of printed products; in the case of typed pages they can be ensured only by using a carbon ribbon.

Structure of Page Reading Program

Depending on the needs of the user the program can be configured as a combination of six components. The reading component is a standard part of the configured program; the other components can be built in optionally. The components can be put into three groups: the reading, the numbers and the teaching component realize the several tasks of image recognition; the blank form component ensures connection to a special use area. The reading component recognizes typed or printed text prepared with Courier, Prestige Elite, Pica, Letter Gothic or Univers letter types.

The letter types can be mixed within one page. As a special service the program component can be supplemented with new letter types or with Cyrillic, Greek, etc. alphabets. The file produced as a result of reading contains the text read and all information pertaining to the writing image which the recognition contains--position, type, line thickness and size of the letters.

On the basis of such data one can check almost all of the properties of the original document (letter accentuation, column structure, letter type changes, etc.).

Number Component Recognizes Numbers Written by Hand

The teaching component makes it possible for the user to supplement the standard core of the recognition system with special signs needed by him the images of which can be obtained through the digitizer and for which the user provides an identification code. This method also ensures intelligent error correction since it may happen that in the course of processing some material the mechanical reading always makes a mistake on a certain letter because of a crude error in the letter image or because of a large deviation from the standard form. The user can classify such a distorted form with a definite sign, can supplement the recognition system with it and during a new reading the reading component will recognize a character so classified.

In principle this program component makes it possible to build in a new letter type, but we do not recommend this method for this purpose since it would greatly reduce the speed and reliability of recognition.

The editing component provides for further processing of the read text with a text editing program selected by the user (Word, WordStar, Multimate, etc.).

The context component checks the recognized text according to the rules of the Hungarian language and if necessary modifies it. This is useful primarily for a test of those characters the forms of which coincide in the letter type used. Examples are "zero" and the letter "O" or the "I" the "1" and the letter "l".

The blank form component supports secure, checked processing of filled in forms. With the cooperation of the user one can record the structure of a blank form. One can give the characteristics of the various fields--for example, hand written or printed, is it obligatory to fill it in or not, how many characters can it consist of, etc. The file obtained as a result of processing serves to load a database.

Further Development Ideas

As of this writing the Reading, Editing and Teaching components of the page reading program have been prepared and the other components will be completed by the end of the year.

We plan a further development of the program so that in addition to hand written numbers it will recognize hand written letters and to make possible the distinguishing and handling of graphic image details on the basis of image recognition.

A domestic replacement for the image digitizing equipment, which for the time being can be obtained only from import, is being developed and following tests with an experimental prototype a decision will be made regarding domestic series manufacture of the device.

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MAGYAR ELEKTRONIKA, TABLE OF CONTENTS

Budapest MAGYAR ELEKTRONIKA in Hungarian No 6, 1987 p 2

On Our Cover

On our cover one can see the communications control of the Telephone Factory, which offers new possibilities for ESZR [Uniform Computer Technology System] and IBM large computer teleprocessing. The authors of the article, Oszkar Kovacs and Balazs Martos, describe the practical result of the research. They describe the place of the TCT 3720 in a large computer environment, the structure of the equipment and its unique feature--its microprogrammed structure.

Data Transmission Networks

Making use of the services of IBUSZ for our travels we get into contact with computers. The data appearing on the screen are answers to our individual questions. By "talking" with the machine we can organize and sort our programs and travels. Andras Borasos describes the development of the IBUSZ data transmission network, from the first steps to the development of an expanded network, and the goals and experiences of the development.

The SITA operates the largest packet switching data transmission network in the world, one which reaches every part of the world.

With the swift growth in demand they have introduced data concentrators by developing a manual and automatic message switching network. Bela Fekete describes the development and the operation of the component units. He is the representative of SITA in Hungary and leads the operation of airport systems.

8984
CSO: 2502/82

DIRECTOR INTERVIEWED ON STRATEGY OF HUNGARIAN INSTRUMENTS FACTORY

Budapest MAGYAR ELEKTRONIKA in Hungarian No 6, 1987 pp 3-4

[Interview with Zoltan K.-Szabo, director general of the EMG (Electronic Measuring Instruments Factory) by Bela Laczko]

[Text] [Question] You were elected by the enterprise council. In your opinion, on the basis of what factors did the choice fall on you?

[Answer] The primary factor for the enterprise council (VT) was that the period without a leader should be as brief as possible. So in the first selection "outsiders" were dropped from among the several suitable candidates. There were primarily conceptual differences among the candidates within the enterprise, they represented different views regarding the future of the enterprise. By finally deciding on me the VT also accepted my concept. As a new program this is the production of electronic technological devices within which the EMG assumes development and manufacture of automatic designing and measurement systems. We will try these out first in our own manufacture and then we felt that, on the basis of the experiences, other equipment manufacturers might also make use of our experiences. Thus we began development of ATE equipment (automated test equipment). Since we feel that in the future it will not be possible to manufacture modern, reliable electronic equipment without these tools we hypothesize that they will represent a real market in both the domestic and socialist relationship.

[Question] As I understand it the EMG made a nice profit last year too. How will the modification of the regulators affect you?

[Answer] I would give a few data in connection with 1986 first. The production growth was 14 percent (in sales receipts, without a price increase); we doubled our capitalist export; we reduced stockpiles by 10 percent; profit was half that of the preceding year, but still greater than the industry average. So good results do not unambiguously guarantee an increase in profits, indeed...! I believe I should explain this. There were two chief reasons for the decrease in profit.

--It was our fault that there was a costs increase which became a significant factor in reducing profit. One of the problems here was the insolvency of enterprises belonging to us, because of which we incurred budgetary

liabilities. The interest burden of these was a good bit higher than the interest on late payments. There were penalties due to late deliveries which burdened us because of the parts import difficulties. The imported parts caused a problem from another viewpoint too; the prices rose because of the devaluation of the forint. All these cost increasing effects could have been moderated with greater attentiveness.

--The so-called normative support system for socialist export--which is connected with the production tax--also developed unfavorably for us; supports became withdrawals.

The drop in profit is causing many problems now, and according to a decree which appeared at the end of 1986 we must reduce wages "retroactively." This brings a reduction in personnel, which understandably is not too popular a measure.

[Question] In my opinion the EMG manufactures too many products, for its size. The instrument industry is one of the most dynamically developing branches in the world, and at the same time it is increasingly specialized. Do you plan to take greater advantage than before of the possibilities of the international division of labor?

[Answer] Specialization is a difficult question in Hungary. I know that in the West there are firms which manufacture only one product family (e.g. logical analyzers) and yet make a fantastic living out of it. I believe that this cannot be imagined under domestic conditions. We have to stand on more "legs" here; specializing on one product group means too great a risk for the future of the enterprise. Let us look at the broad profile of the EMG from this viewpoint!

The EMG manufactures three product groups:

--instruments,
--machine tool controls, and
--ATE devices.

In the past it also manufactured computer technology devices, but it gave up this profile in the past 5-year plan. The charge of many types is true primarily of instruments, but our market conditions make it necessary for the enterprise to have products which can be sold well domestically too. At the same time these product groups are instruments, mostly instruments which need imported parts, and any import limitation can reduce production. The other market factor--the quota nature of socialist trade--can stand in the way of selling our highly valuable equipment (e.g. the ATE). If a regulator change is not to cause a crisis situation at the enterprise we must plan production--in my opinion--so that we can carry out a swift regrouping among the several profiles. The enterprise has the technological conditions for this. We built this up already.

[Question] In regard to the preceding question, it is difficult to get EMG instruments here at home despite the fact that they are quite expensive. What is your opinion about this, can you promise the users an improvement?

[Answer] It is certainly true that it is rather difficult to get EMG instruments on the domestic market, one has to wait a long time at the MIGERT [Instrument and Office Machine Marketing Enterprise] for a new instrument. The MIGERT indicates the need to us too, customers are seeking oscilloscopes primarily. And this is our instrument family with the largest capitalist import content, we simply cannot increase production. What might be done--since oscilloscopes are the profile of the Soviet Union within CEMA specialization--is to sign a manufacturing or trade agreement with the Soviets. Another possibility is for the MIGERT to contribute out of its own foreign exchange allotment to the acquisition of parts, but this might make the instruments more expensive.

We consider an improvement in domestic instrument supply to be important from every viewpoint, we will do what we can for it.

[Question] What is the future strategy of the enterprise, what are its plans, what sort of obstacles must be overcome to realize the plans?

[Answer] Strategic questions are in the sphere of authority of the VT, as I mentioned in connection with the first question; there are no essential differences between the VT and my personal strategic ideas. We will maintain the three product groups; we will expand our profile with products having a greater intellectual content; and we will try to make our products more modern by accelerating technical development. This latter is the biggest problem for us too, as for any other state enterprise. The "free market" has recently increased the value of developmental work; the only problem is that this was not realized within the frameworks of the enterprise. We have no way to give a considerable pay increase to our developers all at once, we cannot restructure the enterprise wage system. We were able to increase the pay of starting engineers; young people start with us today at 5,300-5,500 forints. We are able to honor our experienced engineers, the ones creating new intellectual products, with royalties--on the basis of solutions involving legal protection. Previously this question was unsolved at the EMG, now we want to realize a more liberal enterprise practice. In practice this means that we must pay 10-30 million forints for the more than 100 valid inventions. I think that this will represent sufficient incentive for the more experienced technicians to accelerate development.

I might briefly summarize our tasks in connection with technical development as follows:

--the chief task in instrument development is to increase their intelligence (programmability, higher level processing of data, an ability to build them into systems, etc.);

--we are working on development of a new family of machine tool controls where the role of graphics will increase and the technological parameters of processing (such as calculating knife life expectancy) will be handled automatically;

--the development of the ATE devices is the largest technical task. We would like to deliver complete systems, from the designing system to the test equipment. Development of a multiple work station printed circuit designing system is under way now; it will have an information link with the automatic test equipment. Within the framework of the OMFB-IPM [National Technical Development Committee-Ministry of Industry] ministerial program we are developing a three level hierarchic designing system in close cooperation with the KFKI [Central Physics Research Institute]. The lower level is an IBM PC compatible terminal which serves card design. At the middle level the terminals are connected to a TPA 1173 computer; it is also possible to serve in-circuit testers. At the upper level there must be a megamini which can carry out simulation and test generation tasks. We would like to deliver complete systems, together with know-how and local installation. In this way we could hand on our own--already existing--experience to others.

We know that our developmental ideas are closely linked to the customer market. These are bad times for investments but in connection with the electronification program (EGP) the government is trying to aid industrial development and manufacturing automation therein. Everyone knows that we can be competitive on the market only with products having a higher intellectual content. We can get out of our disadvantageous situation only by "fleeing forward."

[Question] I thank you for the interview and wish you much strength and good health for your future work.

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CSO: 2502/82

TCT 3720: NEW HUNGARIAN DATA TRANSFER CONTROL

Budapest MAGYAR ELEKTRONIKA in Hungarian No 6, 1987 pp 10-13

[Article by Oszkar Kovacs and Balazs Martos: "New Domestically Manufactured Data Transfer Control: The TCT 3720 Teleprocessing Processor"]

[Text] For a long time the Telephone Factory and MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] have cooperated successfully in research, development and manufacture of teleprocessing equipment. Research connected with teleprocessing has been conducted for a long time at MTA SZTAKI in the areas of microprogrammed computer architectures, the technology of microprogramming and computer networks. A practical result connected to this work is the TCT 3720 (EC 8372) teleprocessing processor developed on a commission from the Telephone Factory. The equipment has successfully passed international tests within the framework of the ESZR [Uniform Computer Technology System] and a number of domestic and Soviet state authority tests.

Introduction

The remote and collective accessing of computer resources became necessary in an early stage of computer development. The teleprocessing technique thus developed.

Teleprocessing systems became increasingly complicated in the course of use and the number of remote users increased. As a result the control of more complicated large computer systems put more and more administrative burden on the central computer, and less and less power was available for data processing.

In the course of the development of computer technology they succeeded in solving this contradiction in several ways:

--by increasing the central processing capacity;

--by decentralizing data processing in such a way that data were processed by individually installed micro and minicomputers; and

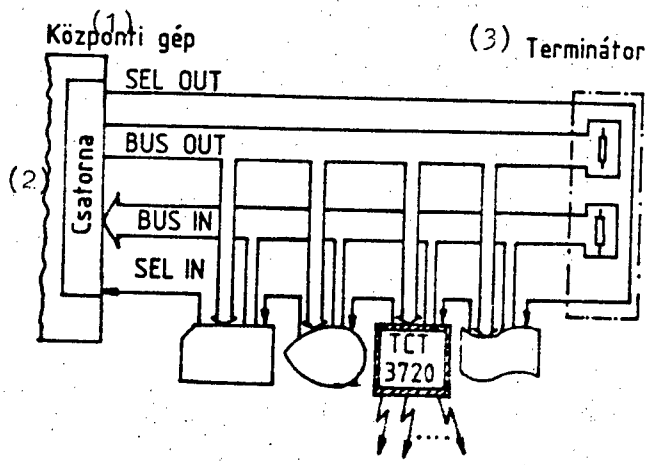
--by increasing the intelligence of the elements of the system, maintaining the teleprocessing structure, in such a way that only data processing tasks accounted for the great bulk of the resources of the central processing unit.

Of the above the first solution soon ran into technical limits and because of its high cost it was not widespread. In certain cases the second version provides a satisfactory solution, if it is not necessary to have an information link between the several processing tasks. In practice, however, data exchange between decentralized processing sites is necessary in most cases, so we come to the third solution, which is the presently most favorable solution for larger information teleprocessing systems. With the spread of the ISDN principle the transmission of digital material causes fewer and fewer problems.

The Place of the TCT 3720 in a Large Computer Environment

In ESZR and compatible large computer systems control units connect data transmission to the I/O interface of the channel. The TCT 3720 also can be connected into a system in this standard way (Figure 1).

Figure 1.



Key:

1. Central Computer
2. Channel
3. Terminator

The TCT 3720 equipment is a programmable data transfer control device, which means that at the beginning of operation its control program must be loaded from the central computer through the I/O interface.

Programmability has the following advantages:

--The system can be flexibly reorganized at any time if we load it with a control program prepared according to new considerations.

--Thanks to the higher degree of intelligence of programmed equipment the link between the computer and the data transfer control is less administrative;

that is, the data transfer control equipment can take over a number of tasks which the computer performed earlier. Relieving the burden on the central machine increases the power of the entire system.

Independent of the loaded control program we use the TCT 3720 equipment in two modes, emulation and network modes. Table 1 compares the two modes.

Table 1.

Parameter	Emulation Mode	Network Mode
Interrupt request in central computer	by character	by message
Insert and delete and character management:		
Directly from central machine:	data tranfer control	terminal
Data transfer control:	access mode	data transfer control
Error correction	access mode	data transfer control
Code transformation	access mode	data transfer control
Managing timing	access mode	data transfer control
Polling terminals	access mode	data transfer control

Internal Structure of the Equipment

The internal structure of the TCT 3720 can be seen in Figure 2. In the following we describe the several components and their functions.

CCU (Central Control Unit)

Provides total control of device. Control of the several interface units (channel interface scanner) takes place through hardware registers connected to the I/O bus. The CCU executes a program located in main memory; the instruction set for it consists of 51 macro instructions.

MEM (Main Memory)

Provides intermediate storage for the control program for the equipment and for data. The control program administers the memory.

CA (Channel Adapter)

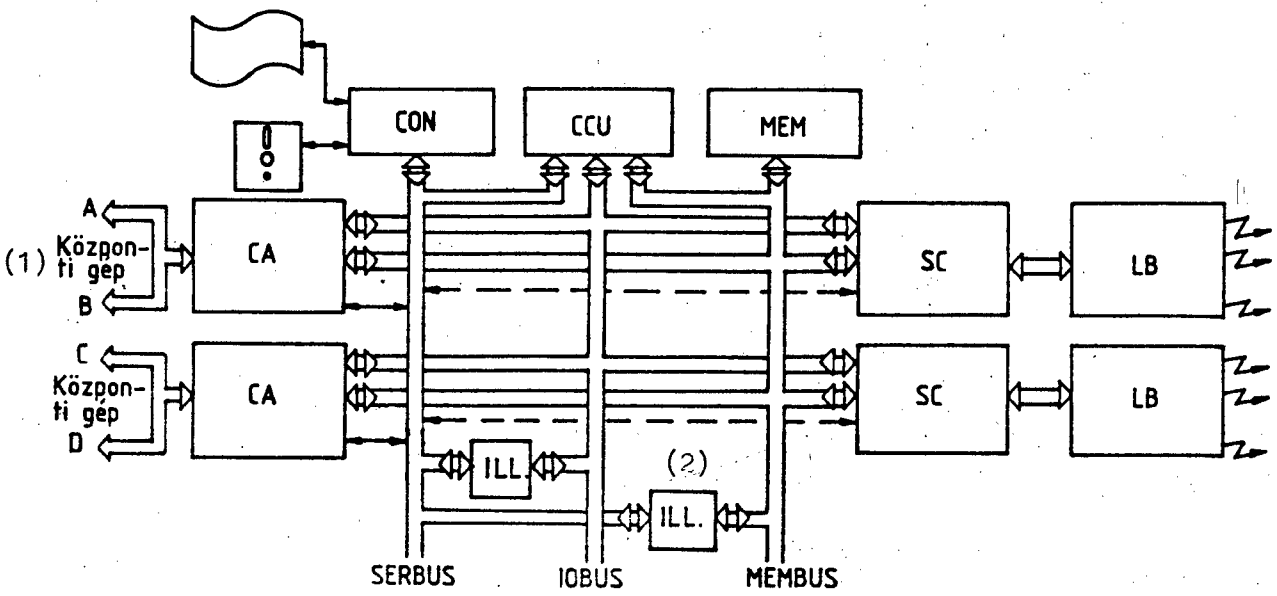
The channel adapters connect the equipment to the central computer. The TCT 3720 can be supplied with two types of channel adapter:

--The type 1 channel adapter (CA1) can operate in both emulation and network mode. It requests interrupts from the central control unit (CCU) of the

equipment by byte. It communicates with the central computer in the form of packets with a maximum of 4 bytes.

--The type 4 channel adapter (CA4) can also operate in both emulation and network mode. It communicates with the central computer in packets with a maximum of 256 bytes without program intervention. Data are transferred between Main Memory and the I/O interfaces by direct memory access in packets of at most 255 characters (bytes).

Figure 2.



Key:

1. Central computer

2. Interface

SC (Scanner)

The equipment handles the data transmission lines with the aid of scanning coupling units. Each such unit can handle a maximum of 32 lines. The TCT 3720 can be supplied with two types of coupler:

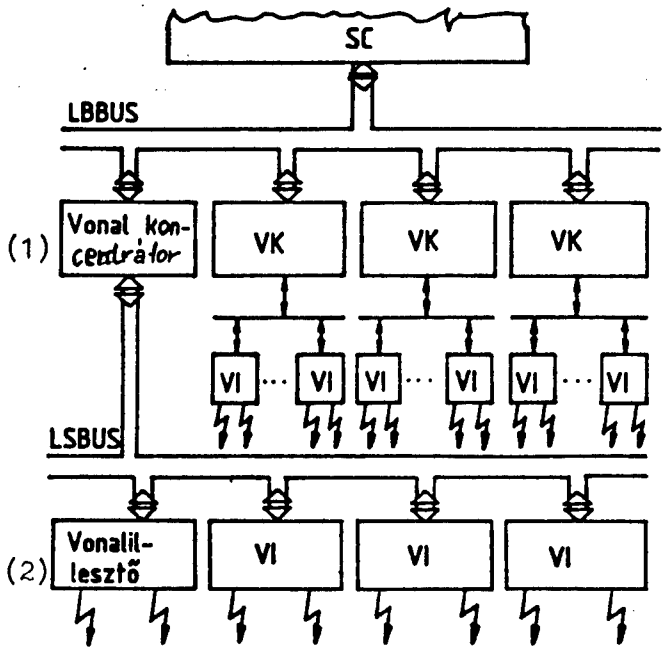
--The type 2 scanner can handle lines working according to any data transmission protocol interpreted to the equipment. The control program regards the data as instructions. The scanner then processes these on the line by bit.

--The type 3 scanner handles lines working according to the SDLC/HDLC protocol. The data are transferred between main memory and the data transmission lines by direct memory access, in packets of at most 255 characters (bytes).

LB (Line Interface)

Figure 3 shows the hardware structure between the scanners and the data transmission lines.

Figure 3.



Key:

1. Line concentrator
2. Line interface

Each line concentrator can handle four line interfaces. Each line interface serves two data transmission lines. The line interfaces can be located as one likes in the available spaces.

Four types of line interfaces can be used in the TCT 3720 equipment:

--a line interface working according to the Start-Stop and BSC protocols,
--a line interface working according to the SDLC/HDLC protocol,
--a line interface working according to CCITT proposals V.25 or S.16, controlling automatic caller; or
--a line interface controlling automatic call according to CCITT proposals X.20 or X.21.

CON (Console)

The console is an intelligent component of the TCT 3720 based on an 8 bit personal computer. The program running in its operational memory works independently of the TCT 3720. Information exchange between the TCT 3720 and the console is handled over a special hardware and software interface.

The several components of the equipment can be accessed with the aid of the hardware interface (SERBUS). This makes possible the testing of microprograms running in the several adapters.

Two each input and output registers support data transfer between the central control unit (CCU) and the console. Through these the operating status of the TCT 3720 can be monitored from the console during operation. There is also a possibility for control of the TCT 3720.

The link between the console and the main memory of the TCT 3720 offers numerous diagnostic possibilities with the aid of which one can even intervene in the control program of the equipment. This could be the listing of a given memory area or writing to a given memory area.

The peripherals of the console (disk and printer) offer the possibility of automating diagnosis of the equipment (program loading, journal, etc.).

The Unique Feature of the TCT: Microprogrammed Structure

In general the speed and power needs of equipment handling serial data transmission lines are not so great that control of it could not be handled by the somewhat slower microprogrammed method instead of a purely logic circuit solution. In regard to their functions purely task oriented logic circuits for the most part become rather complicated so the advantages offered by microprogramming appear in an obvious way.

Among the advantages one might stress the smaller need for parts. A microprogrammed version is favorable not only from the viewpoint of price and the size of the equipment but also because it increases reliability, so it is important to consider jointly the needs of the user and the reliability of the available parts.

In addition to all this it is of great significance for practice that microprogrammed equipment is reviewable and testable so that repairs--in case of failure--are substantially simpler. The economic advantage of this appears in less expenditure for the manufacturer and in shorter downtime for the user.

We would like to believe that in developing the TCT 3720 (EC 8372) teleprocessing processor we took good advantage of the theoretical considerations and practical possibilities connected with microprogramming.

Additional Technical Data on the TCT 3720

Software support:

The equipment can be controlled by the DOS, OS, VM, DOS/EC, OS6 and OS7 operating systems. In addition it is supported by BTAM, TCAM and VTAM access modes, by EP, NCP and PEP control programs and by OLTEP and OLTSEP diagnostic programs. The number of macro instructions interpreted is 51.

Table 2 shows the computer-side surface:

Item	ESZR	IBM
Central computers which can be connected	R 20, RYAD-2, RYAD-3	Systems 360, 370, 3400, 3030 and 4300
Channel types which can be connected	mpx, selector	mpx, selector
Number of central computers or channels which can be connected	a maximum of 4	
Transmission speed in the channel	max. 20 K bytes/s	

The characteristics of the line-side surface are given below.

Interface types:

--CCITT V.24/V.28 (ISO 2110; RS-232-C)
--CCITT V.25 (ISO 2110; RS-366)
--CCITT X.20/X.24 (ISO 4903)
--CCITT X.21/X.24 (ISO 4903; RS-422)
--CCITT V.35 (ISO 2593)

Types of telecommunications lines which can be connected:

--switched or leased 2/4 wire telephone connection;
--leased 2/4 wire galvanic connection;
--public postal line switched data network;
--broad band connection.

Data transmission speeds:

--with internal clock signal, 50 - 19,200 bps;
--with external clock signal, max. 64 K bps.

The maximum number of data transmission lines which can be connected is 64.

Types of Terminals Which Can Be Connected

ESZR Code No	ESZR Model	IBM Model	Protocol	Code
EC 8591	T 51		Start-Stop	MTK 2
EC 8592	T 63 T 100 F 1000			CCITT No 2
EC 8570 EC 8575M	TAP 70	2740/41	"	CCITT No 5; ASCII; KOI-7

(continued next page)

Types of Terminals Which Can Be Connected (continued)

ESZR Code No	Model	IBM Model	Protocol	Code
EC 8564	AP-64	2260	Start-Stop	CCITT No 5; ASCII; KOI-7
EC 8534.01	TAP 34	2780	BSC	"
EC 8534.02	"	"	"	"
EC 8534.03	TAP 34VER	"	"	"
EC 8534.75	TAP 34EDT	3275	"	"
EC 7290	TAP 34GDT	3276	"	"
EC 7920	"	"	SDLC/HDLC	"
EC 8566			"	"
		3767	"	ASCII

Autobiographic Notes

Oszkar Kovacs: I graduated from the Electrical Engineering School of the Budapest Technical University in 1971. Since then I have worked in the computer technology development main department of the Telephone Factory. I have participated in or led the development of a number of data transmission devices (modem, telegraph line coupler, error protection equipment). I won my doctorate in 1985 at the Budapest Technical University, on the theme of operations monitoring questions with computer networks. At present I am leading work connected with development and manufacture of the TCT 3720 processor. My interests are computer networks, technical history and choral singing.

Balazs Martos: I graduated from the Electrical Engineering School of the Budapest Technical University in 1977. Since then I have worked at the Computer Technology and Automation Research Institute of the MTA. During the past 10 years I have done or guided microprocessor hardware-firmware work on various research and development themes. I am especially interested in questions of microprogrammed control. I and my colleagues received the Institute Prize for development of the TCT 3720 processor.

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CSO: 2502/82

HUNGARY: SIMPLIFIED PROGRAMMABLE LOGIC CONTROL

Budapest MAGYAR ELEKTRONIKA in Hungarian No 6, 1987 pp 35-39

[Article by Lorant Vargha: "A PLC Central Unit." The first paragraph is the summary provided by the journal.]

[Excerpts] The article deals with several systems technology questions of PLC's. It compares the central units of various products and on this basis proposes a new circuit and systems technology arrangement. The essence of the solution is that it creates--in addition to the usual addressing system of 8 bit microprocessors--a memory reference addressing mode. The execution time for logical instructions decreases significantly with this solution. In conclusion it presents a solution which simplifies the writing of the PLC program in that it demands less systems technology expertise from the designer.

Reducing Cycle Time With Hardware

Our research was directed at how to exploit the advantages of microprocessor and logical processor systems without having to use a multiprocessor system. We summarize the results of this research below.

Development of Central Unit

The essence of the solution is that we accelerate with a circuit solution the execution of the large number of logical tasks necessary primarily in PLC equipment, still using customary microprocessors. This is done by using, when developing the circuit, a "memory indirect" addressing possibility to select the variables for a solution of logical tasks.

The solution is based on the following perception. For example--taking the Intel 8080/85 microprocessor as a base for the illustration--the ANA M;: ANA r and ANI D instructions are available to execute the AND operation. Of these the ANA r instruction given with mnemonics executes the operation between internal registers and so cannot be used for the variables stored in memory.

Execution of the ANA M instruction is as follows:

--During the first cycle (fetch) it reads in the instruction code (ANA M) which can be found in the memory addressed by the program counter.

--During the instruction execution cycle the internal HL registers determine the memory-address-channel, the AND operation takes place by place value between the content of the memory cell thus selected and the previous value of the accumulator.

Thus this instruction is not directly suitable for execution of the usual instruction in a PLC (instruction code and variable address).

With the circuit solution which can be seen in Figure 1 one can develop hardware with which the above instruction form can be executed also.

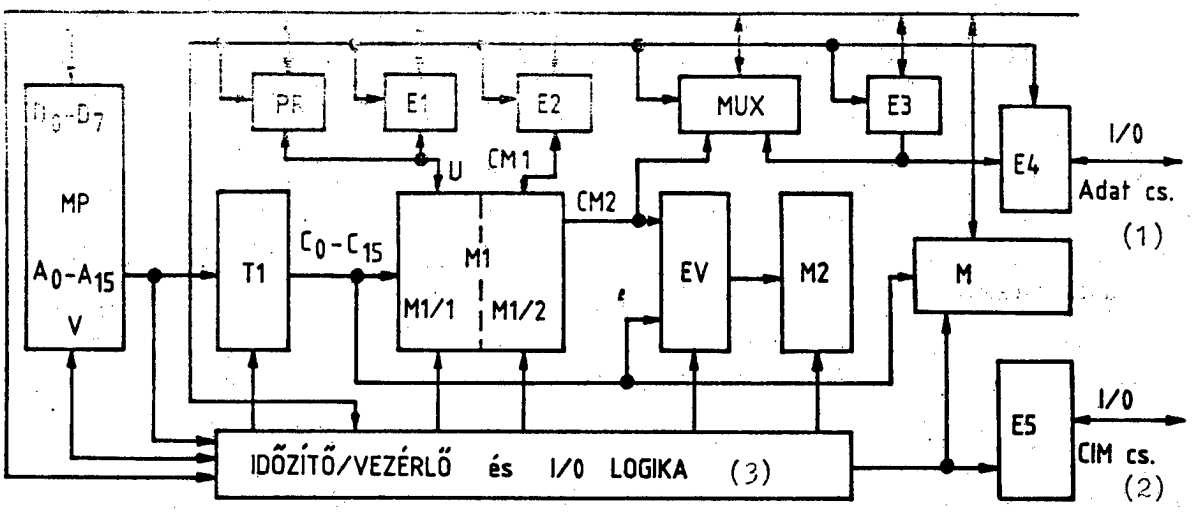

Figure 1. Key:

1. Data channel
2. Address channel
3. Timing/control and I/O logic

Naturally we have shown only that part of the central unit with which the solution can be demonstrated.

The essence of the solution is that the microprocessor can access the variables stored in the M2 memory by memory indirect addressing. The task of the MUX unit is:

--if the M2 has a "1" bit organization it generates the unit complement of the input or output variable, depending on the instruction;

--if the M2 has an "n" bit organization it selects the variable in addition to the above task.

Logical instructions can be executed directly with this circuit solution if the timing/control unit operates as follows.

In the (fetch) cycle the program counter address given by the microprocessor is set aside in the T1 store. The information appearing at outputs C_1-C_{15} selects the "k" bit instruction code stored by M1/1 and the value of the variable address ("n" bit) belonging to the instruction, stored by M1/2.

In the fetch cycle the "k" bit instruction produces through the instruction code converter PR (preferably a PROM) something which is "understandable" to the microprocessor (ANA M in our example), which the microprocessor samples.

If the value of "k" is identical with the word length of the microprocessor there is no need for code conversion, so the instruction code can reach the data bus through the E1 unit.

During the fetch cycle the M1/2 "n" bit address part controls the address inputs of the M2 memory and--if the MUX is included--of the multiplexer. Thus the selection of the variable begins in this cycle.

In the second cycle of the instruction the microprocessor gives the content of HL to the address channel (A_0-A_{15}) but the timing/control logic forbids loading it into T1 so the previous PC content remains in it.

In the execution cycle the timing/control logic enables the MUX and a link is created between the data channel and the M2. During instruction execution the value of the program counter has increased by one, and execution of the next instruction can begin.

Naturally other logical instructions can be used in a way similar to ANA M, for example ORA M, XRA M and of the data transfer instructions, for example, the MOV A, M and MOV M, A, which can execute load and storage of the variable.

The customary PLC instructions and the mnemonics of the Intel instructions realizing them--remembering that the MUX unit is also capable of complementing the variable--are:

LD	Load	MOV A, M
LDC	Load Complement Data	MOV A, M
AND	AND	ANA M
ANDC	AND Complement Data	ANA M
OR	OR	ORA M
ORC	OR Complement Data	ORA M
XOR	XOR	XRA M
XORC	XOR Complement Data	XRA M
STO	Store	MOV M, A
STC	Store Complement Data	MOV M, A

There is no need for a Wait condition during instruction execution so presuming a clock signal of 320 ns an instruction execution takes 1.2 microseconds.

The task of the memory M is to store firmware and other programs. The E1 and E3 units offer an opportunity to check and modify the several memory cells, while the E4 and E5 enabling/forbidding units maintain the link between the M2 memory and the I/O units. Every unit can be realized from the usual circuit assortment.

For realizing the count/delay function one can use the RST instructions, with which one can call the appropriate subroutine. But it is useful to design the timing/control unit in such a way that even then there should be a possibility for realizing memory indirect addressing. According to calculations the delay routine requires about 15-20 microseconds. The useful instruction structure is as follows:

M1	M2
Instruction code (delay)	address 1
Constant	address 2

where address 1 can contain, for example, the place of the delay value--which thus can be changed from the program--and the constant can be the delay value--which cannot be changed from the program--and finally address 2 can show the place of the current value of the delay value. Naturally only one of them can be given as the delay value, the other value is indifferent.

If the timing/control unit is suitably structured the M1/1 and M1/2 can also be used to run other programs, for example machine code programs.

Direct addressing logical instructions can also be used, in a mannger similar to the above, with the "memory indirect" addressing mode without changing in principle the arrangement which can be seen in Figure 1. The necessary change to the M1 memory block can be seen in Figure 2.

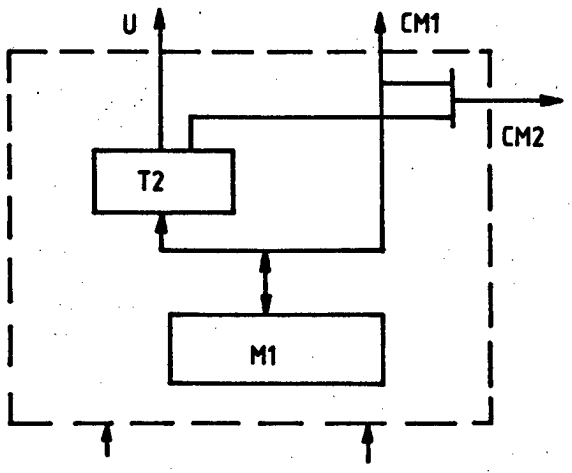

Figure 2.

The memory block was prepared presuming that the instruction code--which T2 stores--also contains an address part. Thus the CM1 address is determined jointly by the stored and the subsequently addressed memory (M1) output. The CM1 channel serves to access the M1 memory through the E2 unit. In this case there is no need for an E1 unit. The timing/control logic depends on the requirements selected but it must ensure the following instruction execution.

We will describe the working of the system with an ANI M instruction. Now the PLC instruction can be in the M1 memory in two sequential locations:

a. the instruction code and the variable address part depending on the solution,

b. the other bits of the variable address.

Execution of ANI M is as follows:

--During the fetch cycle the information in C_1-C_{15} (output of T1) selects the instruction code and the variable address part, which are stored in T2, and the instruction code gives the ANI M instruction code, through the PR code converter, to data channels D_0-D_7. At the end of the fetch cycle the address of the program counter increases by one.

--In the execution cycle the content of C_2-C_{15} points to the second byte of a PLC type instruction, which contains the value of the variable address.

Selecting the value of the variable can take place in the manner described above.

Without detailing the rest of the operation, the Intel mnemonics corresponding to the PLC instructions described above are the following:

LD	Load	IN D
LDC	Load Complement Data	IN D
AND	And	ANI D
ANDC	And Complement Data	ANI D
OR	Or	ORI D
ORC	Or Complement Data	
XOR	Xor	XRI D
XORC	Xor Complement Data	XRI D
STO	Store	Out D
STOC	Store Complement Data	Out D

Note: In the case of the Out instruction it must be ensured that the T1 store gets a write-in signal only in the first two cycles, so in the output cycle, when reading in the second byte, T1 will store a valid PC address.

The advantage of this systems technology solution compared to the preceding one is that memory utilization is somewhat better; the disadvantage is that instruction execution is slower because, presuming elements with the same speed, a Wait condition must be inserted in the execution cycle, and design of the timing/control unit is more complicated.

In both systems the timing/control unit can determine the signals needed to authorize operation of the several units on the basis of the following information:

--It follows at the time of a PLC type instruction.
It is useful to store the information in a flip-flop which can be set from the program, the value of the address domain can also be used to erase it.

--The address domain.
It is also useful to maintain "memory indirect" addressing for non-PLC type instructions.

--The microprocessor timing/control and a status indicator (e.g. signals of the M1).

During data traffic between the peripheral units and the M2 memory the timing/control unit must ensure joint use of the M2. During this time the microprocessor is also capable of carrying out other tasks. In the case of small systems, naturally, such a structure of the input/output logic is not absolutely necessary.

Memory Organization

Another factor in developing PLC's is that they should require the least possible digital systems technology knowledge from the person preparing the control technology program. As we already mentioned, in the case of a PLC operating with stored variables the designer need not know of the existence of the hazard, which is a good example of the foregoing.

At the same time a task described with the following interdependencies--which is a program for a stepping register function--cannot be realized with a sequential program. In studying the connection we presume that $C_p=1$ exists for only one cycle time.

$$Q_1=C_pS_{in} + C_pQ_1$$
$$Q_2=C_pQ_1 + C_pQ_2$$
$$Q_3=C_pQ_2 + C_pQ_3$$
$$\vdots$$
$$Q_n=C_pQ_{n-1} + C_pQ_n$$

When the $C_p=1$ condition is met the $Q_1=S_{in}$ condition is also met if the central unit is to solve the other $Q_2 \ldots Q_n$ interdependencies, so after solution of the entire $(Q_1 - Q_n)$ function the total output has a value of

$$Q_1=Q_2=Q_3=\ldots Q_n=S_{in}$$

which is obviously false.

The general method for eliminating the phenomenon described above is to save the output variables in a buffer; in the course of solving this we solve the equations with a stable value for it. The method is shown in the following example:

$$Q_1=C_pS_{in} + C_pQ_1$$
$$Q_2=C_pP_1 + C_pQ_2$$
$$\vdots$$
$$Q_n=C_pP_{n-1} + C_pQ_n$$
$$P_1=Q_1; P_2=Q_2 \ldots P_n=Q_n$$

The disadvantage of the solution is that the programmer must recognize that similar phenomena can enter a critical competition situation and eliminating this requires additional program steps, which slows program running.

The following solution eliminates both problems.

We divide the part of M2 containing the input and output variables into two parts each:

$M2/I_x$, the old value of the input variables, if x=1,
$M2/I_x$, the new value of the input variables, if X=0,
$M2/O_x$, the old value of the input variables, if x=1,
$M2/O_x$, the new value of the input variables, if x=0,

where the value of x is given by the following interdependency:

$x=V+A_y$ logical, when addressing a PLC variable, where:

V is the control bit, which is set by the CPU, the value of which should be complemented after execution of the control algorithms, and

A_y is the address bit, which distinguishes the two domains of the input and output variables.

To make the above more concrete let the memory domain of the logical variables be 256 bytes.

Then the A7 bit of the address selects the location of the input and output variables;

The A6 bit of the address can figure as A_y; and

A0-A5 determine the byte containing the logical variable addressed.

On this basis the I/O logic is:

V=0	A_6=0	0-63
V=1	A_6=0	64-127
V=0	A_6=1	64-127
V=0	A_6=0	0-63

loading the input variables to the memory area, and

V=0	A_6=0	128-191
V=0	A_6=1	192-255
V=1	A_6=0	192-255
V=0	A_6=1	128-191

refreshing the stores of the output units with data in the memory area.

During a program run the above operation can also take place with the well known DMA or cycle stealing method.

The addressing of the logical variables can take place with a value of $A_y(A6)=1$; then one can refer to the value of variables read in in the preceding cycle, or one can determine a new value for output variables to be issued in the next cycle.

Since the value of V changes after the running of the entire PLC program, the domains are transposed.

With this solution, in a manner similar to the initial examples, one can write only the value of the output variable with $A_y=1$ and the feedback value of the output variable must be addressed with $A_y=0$.

It is not absolutely necessary for the user to determine the values of the A_y bit, for the handling of it can be algorithmized and a program to handle it can be written by using an intelligent programmer.

The chief advantages of the solution are:

--the program run speeds up significantly, for the loading and reading of the I/O memory take place during the program run so they take practically no extra time;

--it simplifies the program, so in addition to speeding up running time it reduces the memory area;

--it simplfies the writing of programs realizing sequential circuits.

Autobiographic Note, Lorant Vargha

I graduated from the Electrical Engineering School of the Budapest Technical University in 1970 and won my engineering teacher's degree in the same year. I got a job at VILATI where--in various main departments--I dealt with development of telemechanical systems. I changed jobs in 1978, working since at the Kalman Kando Electrical Industry Technical College. I defended my doctoral dissertation in 1980 on the theme of telemechanical systems. I have

participated in the work of a number of OMFB [National Technical Development Committee] committees. At present I am dealing with microprocessor technology and PLC's. A number of my circuit and systems technology solutions in these areas have been patented.

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EXHIBITS AT PLOVDIV, BULGARIA, FAIR DESCRIBED

Warsaw WIADOMOSCI ELEKTROTECHNICZNE in Polish No 3-4, 1-5 Feb 87 pp 64-66

[Article by Tadeusz Szafarz: "42nd Fall Fair in Plovdiv"]

[Text] The 1986 International Technical Fall Fair in Plovdiv took place from 29 Sep to 6 Oct 1986. Exhibitors at the fair were 2178 firms from 35 countries (at the previous fair, 2000 firms from 30 countries were represented). The largest exposition--according to what has already become a tradition--was that of Bulgaria, which occupied 44,000 square meters of exhibition surface. It consisted of 7000 exhibits, of which almost 41 percent were new products.

The Bulgarian strong-current electric engineering industry was represented at the fair, as usual, by the foreign trade enterprise Electroimpex. The offerings included a broad list of electrical machines, high- and low-voltage equipment, power generators, transformers, electrotechnical materials, lighting appliances, medical and measurement instruments, electrical tools and electrical household appliances. The largest producer of strong-current electrical engineering in Bulgaria is Elprom Integrated Works. Its exhibits included a large number of innovations. Of special interest were the following:

In the transformer group: three-phase oil power transformers with two (aluminum) windings, series TMPY, with a rated capacity of 6.3-50 MVA/110 kV; they are designed for electric substations and for large industrial enterprises; another exhibit was a transformer station with dry transformer of capacity 400 kVA, type PKTP 400/10.

In the electrical machine group: three-phase general-purpose asynchronous motors series AIR, with a power of 17.5-30 kW (shaft elevation 160 and 180 mm, operation type S1, insulation class F, protection degree IP44), and three-phase asynchronous squirrel cage low-voltage motors of series M, with a power of 45-315 kW and shaft elevation of 200-315 mm (protection degree IP23). These products are largely superior to previous models: They are smaller, lighter, have a greater starting torque, stable characteristics and a high reliability and longevity.

In the group of drives for numerically controlled machine tools and industrial robots (which was a large group, represented in a separate exhibition by Elprom Integrated Works), a wide spectrum of electric motors and thyristor converters were shown. In particular, a three-phase squirrel cage motor of 18.5 kW for the main drive of digitally controlled machine tools (rated speed 1300 rpm, regulation range 1:1000) and a thyristor converter for frequency control of asynchronic drives of Ometir type with a power on the drive shaft of 5.5-15.5 kW (rotation speed regulation range 1:10) were on display. The set of electrical equipment for 16K20T machine tool and industrial robt RB241 were other remarkable exhibits.

Some other products: a wheeled welding unit E2A315 (welding current regulated in a range of 45-315 A), thyristor regulator for smooth start of asynchronous motors, REP type, power 7.5-75 kW (the unit ensures obtaining optimal cos ϕ factor).

The large-scale development of the industry of small electrical machines with a broad spectrum of applications in household appliances, electrical equipment, mechanical vehicles and automation devices was reflected in the offerings by Elprom Integrated Works and the exhibits presented by IZOT Integrated Works (hybrid step motors).

Elprom exhibited the following in the group of low-power electrical machines:

--single-phase squirrel cage induction motors with working capacitor types EDBP and EORK for automatic washing machines;

--single-phase induction motor with divided poles, type EC 58/2;

--single-phase induction motor with working capacitor type EZS 120M2.1 for juice squeezers;

--three-phase six-pole squirrel cage motors, types EKT 40/6 and EKT 120/6A, intended as drives for load carriages with carrying capacities of 500 and 1000 kg, respectively; and

--direct current motors with permanent magnets, such as EAK and EAP, for fans or portable compressors.

The exhibits of the foreign trade enterprise Izotoimpex included new hybrid step motors. They are intended for automation devices, robots, digitally controlled machine tools and also for computer technology. These products feature a large synchronization moment--static and operational--while being small in size. Other merits include low noise level and large range of rotation speed control.

Izotoimpex exhibits included a broad range of computer technology products. In conformity with world trends, the majority of products on display were in the area of microprocessor systems. A large number of personal and professional microcomputers were shown. Of special interest in the area of systems

for control of engineering and manufacturing processes and systems for automation of research-and-development work were the following:

--32-bit IZOT 1055C minicomputer with a 16Mb RAM memory and a floating point processor;

--modified 16-bit IZOT 1016C.M1 minicomputer with a 124K RAM and a floating point processor; and

--IZOT 1030C microcomputer built on the basis of the 16-bit K1810BM86 microprocessor (an Intel 8086 clone) with 141 interface (Multibus clone) and a memory capacity of 0.192 to 1 Mb.

By tradition, one of the major exhibitors at the Plovdiv Fair was Balkancar, a producer and exporter of electric and combustible engine transportation vehicles. In particular, Balkancarpodem, a subsidiary of this enterprise, offered a broad choice of modern electrical transportation lifts. The following products deserve a special mention:

--electrical line transportation cabins T35 and T39 and their versions with four-point suspension, which doubles the lifting power without increasing the size of the equipment. The power of the electric motor used for lifting, depending on the carrying capacity and elevation speed, ranges from 1.5 to 13 kW (lifting capacity from 2 to 16 metric tons, elevation speeds 4 and 6 m/min). The horizontal load transportation drives, with two speeds of 20 and 32 m/min, range in power from 0.25 to 0.55 kW (for lifting capacities of 2-12.5 metric tons).

--chain electric transportation lifts of MB type, equipped with 4- or 12/4-pole motor and a cone brake. The insulation degree of the motor is IP44. These lifts have terminal switches of top and bottom position. The drives are button-controlled. Here are some of the parameters: lifting capacity up to 1 metric ton, elevation up to 6.4 m, lifting engine power up to 0.76 kW, horizontal drive engine power (in the version with a cabin) up to 0.18 kW.

--electric transportation lifts BT104 in an explosion-proof configuration; these units are intended for operation in roofed warehouses and production halls and areas exposed to leaks of hot fumes and vapors. The electrical drives of lifting and horizontal movement mechanisms are manufactured from iron castings. The transportation wheels and the suspension hook are made of a nonshrinking material (a nonferrous metal). Thermal safety units cut off the power of electric drives when the temperature rises to a critical level; there are two terminal switches. The lifting power of BT104 vehicles is 2 metric tons; elevations 6, 9 and 12 m; lifting speed 8 m/min; horizontal movement speed 20 m/min; type of antiexplosions protection (Ex) dII BT4.

Polish industry was represented at the fair by 29 trade agencies. The largest Polish exporter of electric engineering products--Elektrim--presented a large variety of exhibits. It exports to Bulgaria particularly equipment for nuclear and conventional power industry, products for strong-current engineering and

communication technology. Among the high- and low-voltage products on display were switches, lining insulators, lightning arresters, safety valves, star-triangle starters, a thyristor converter and sets of clamping materials.

In the group of electric motors Polish products included electric drives, with an explosion-proof version; in the category of fireproof mining equipment, OV-1202 contact breaker, 660 V, and OZTU-1351 transformer, 660 V. Among remote control units shown at the exhibition was a multiplex telegraphic apparatus TGFM-8n and fire signalization station CSP-02. A Teldis switchboard and interoffice communication device manufactured by Tetlko-Telfa in Bydgoszcz deserves special mention; the product was nominated for the gold medal of the contest.

Metronex was repesented at the show mainly by automation devices and electronic measurement equipment, including the four-channel multifunctional microprocessor regulator Eftronik M. As usual, printers made in Poland under a CEMA specialization contract were on display.

The exposition from Unitra Central Agency featured color kinescope A56-701x made by Polkolor in Piaseczna. Other exhibits included monitors, letter synthesizers, telephone conversation recorders of type RK-153 and semiconductor mateirals and subassemblies.

The products exhibited by Varimax included a food processor, electrical oven and hotplate.

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